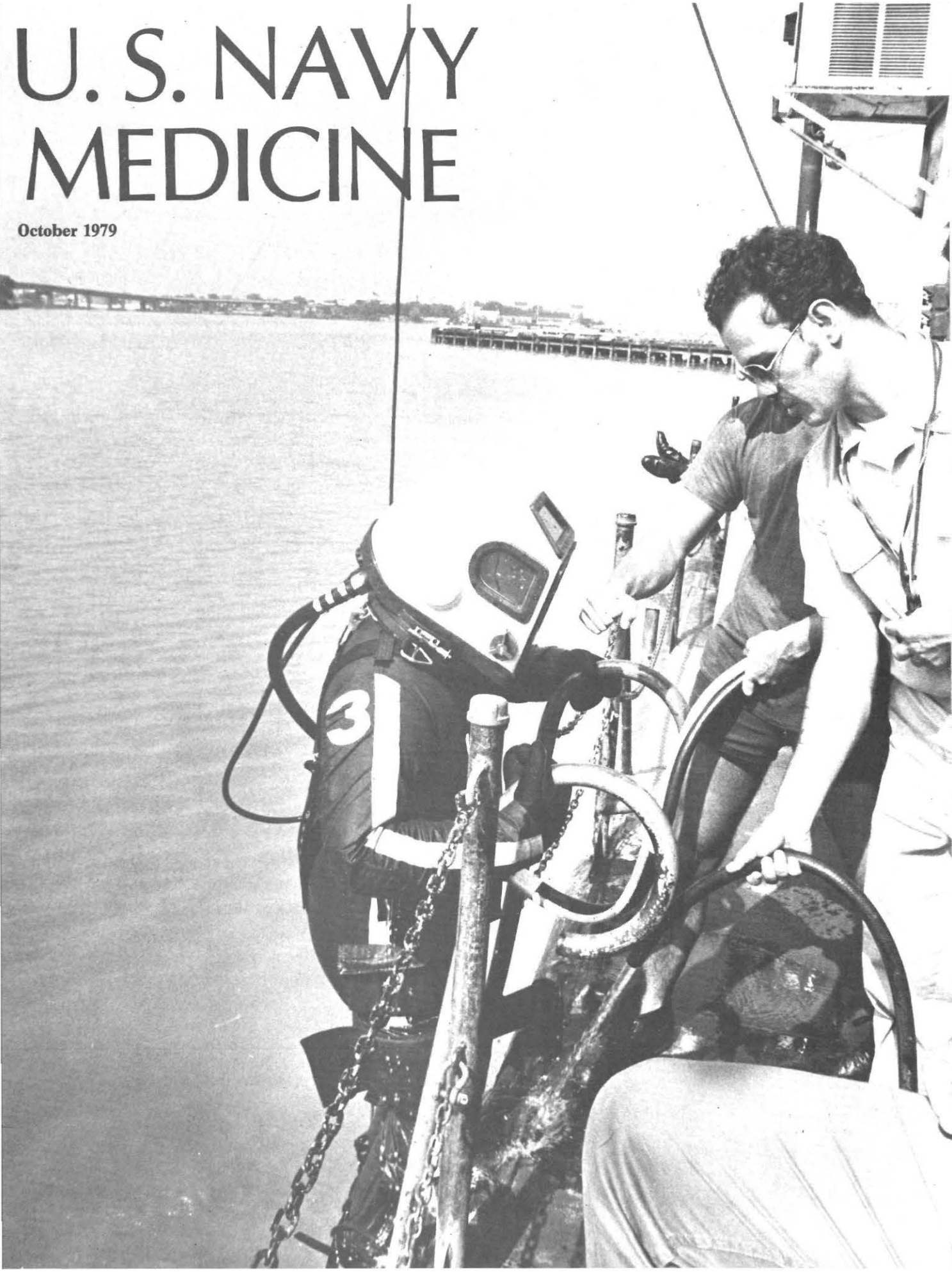
U. S. NAVY MEDICINE

October 1979



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COVER: Under the watchful eye of instructor GMGC Walter Joslyn, a student at the Navy School of Diving and Salvage in Washington, D.C. boards the diving barge after having performed an assigned task on the river bottom.

Navy Committed to Quality Health Care

This is part II of an excerpt from a recent statement by VADM Willard P. Arentzen, Surgeon General of the Navy, before the Defense Subcommittee of the House Appropriations Committee on Navy medical activities.

Pay and Retention

Stable pay significantly affects recruiting and retention. An increased ability to recruit and retain physicians has resulted from variable incentive pay legislation. However, the earlier positive effects have gradually been eroded by two problems. First, periodic extensions of the variable incentive pay legislation have resulted in some uncertainty throughout the medical community. Secondly, inflation has reduced the value of the variable incentive pay bonus because legislation established it at a fixed amount. Discussions at the local command level with physicians planning to leave active duty confirms these as major retention obstacles.

Graduate medical education provides further inducement to recruitment of adequate numbers of physicians. In addition to internships, a wide variety of specialty residencies are available. At the present time 18.8 percent of the current Navy physician force is engaged in residency training. Not only does resident training provide an inducement to military service, but the residents are part of the contingency response base. They provide patient care to all military beneficiaries and provide the Navy with the specialists required. We also must provide our professionals with sufficient opportunity to keep abreast of new health care knowledge and techniques through continuing education at meetings, seminars, and short courses.

Uniform Staffing Standards

The balance of specialists as well as the total number of health care professionals is also an established element in retention. There is presently a study underway to establish more uniform staffing standards which will assist in designing more efficient cost-effective manning levels at all medical facilities. This study is to consider not only the peacetime role of the Medical Department, but also how the wartime requirement increases, thus providing the best mix for both roles.

Although recruitment and retention are primarily affected by the availability of graduate medical education and a stable pay program, other more subtle, yet nevertheless important, factors have a definite effect on our ability to retain health care professionals.

Periodic changes alone are not the answer. If retention is the key to success, as we believe it is, then what we are seeking is support in establishing an underlying foundation of stability in the areas of pay, equipment, and ancillary support. Uncertainties must be removed.

Ancillary support is the backbone of the physician's ability to effectively provide direct health care in an efficient manner. Changing the manning level of one element of the health care team without a corresponding change in the other decreases teamwork effectiveness. Without adequate numbers of ancillary personnel in the right categories, that is, both military and civilian, a degradation of medical care efficiency takes place in the direct care system and also decreases the contingency mobilization base capability. As doctors must gradually assume greater numbers of duties normally assumed by ancillary personnel, the potential number of available treatments provided must then necessarily decrease in order to maintain quality treatment. Reduced availability of care not only impacts on active duty personnel but on all other eligible beneficiaries as well.

The physician's assistant has been a welcome adjunct to the health care team. The Navy Medical Department presently has 265 authorized physician's assistant billets and 239 onboard. The projected number for each of the next five years is 264. The Navy is now recruiting for civilian sector physician's assistants with little success at this time.

Later this year, a new Navy-sponsored physician's assistant training program will commence at Naval Regional Medical Center, Portsmouth, Va., and at Naval Regional Medical Center, San Diego, Calif., with classes of 20 and 25 students, respectively. This program will be in conjunction with George Washington University and will train a physician's assistant in approximately one year.

The Navy physician's assistant is not a substitute for a physician but rather a supplemental health care provider who treats patients under the direction of a physician. Presently, the Navy is considering them for shipboard duty and also for contingency roles.

It is important to note that this is a role expansion, not of the physician's assistant, per se, but of the advanced hospital corpsman; and the physician's assistant in this role is viewed by the Navy not as a

(Continued on p. 29)

Prison Diary

In September, U.S. Navy Medicine ran part I of an article based on the diary of Chief Pharmacist's Mate Adolph Wessel Meyers. Captured during the occupation of Guam by the Japanese on 10 December 1941, Meyers and his comrades were taken to Japan and held first at Zentsuji and then at the Tanagawa POW camp. He and a small medical staff, working with little or no medical supplies and on short rations, did what they could to treat patients and save lives. In the spring of 1943, as conditions began to improve at Tanagawa, the prisoners prepared for yet another move.

Umeda Bunsho

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14 May 1943

Packed my clothes, sold many of them because of rumored stripping.

Chief Meyers had made a habit of preparing for sudden moves. The following day guards relieved him of all his clothes except for one pair of shoes, socks, underwear, and dungarees.

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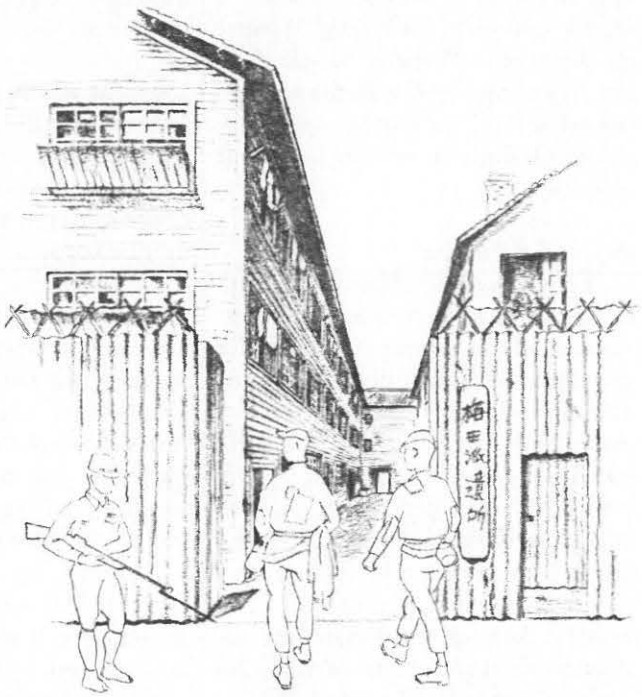
16 May 1943

160 Navy + Marines left Tanagawa 0700 in rain. Came to Osaka by electric train. Took subway to Umeda Bunsho about 5 K.M. from Osaka Nanba. Started doing medical work immediately; assisting Drs. Nell and Brown. Am the only corpsman. 28 sick; mostly nutritional conditions. Assigned No. 221. Sleep in section 10.

Located near the Umeda train station near downtown Osaka, Japan's largest industrial city, the bunsho was already a well-worn camp when Meyers and his comrades arrived. It was surrounded by a high corrugated tin fence atop which bristled sharp bamboo stakes. Within, loomed a dilapidated three-story frame building with broken boards and a roof with missing or broken tiles. Through shattered windows, hollow-eyed and physically broken men peered at the new arrivals. Many were Marine and Army survivors from the Philippines.

With the new prisoners, the camp's population now stood at 315. At Tanagawa the Americans had been forced to build a large drydock and move part of a mountainside with pick and shovel. At Umeda, the work involved stevedoring at 12 railroad stations in the Osaka area, loading and unloading box cars. The cargoes were drums of chemicals, foodstuffs, salt, bags of lime, aircraft parts, machinery, and tobacco. Working conditions were poor and there were many safety related injuries, some fatal. However, there was ample opportunity to pilfer food. Much of what the men were able to steal kept them alive.



Umeda Bunsho —sketch by Murray Sneddon from Laughter in Hell

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28 May 1943

Tramposh detailed in hospital (Section 16) with me; boy, what a relief.

The medical staff at Umeda consisted of an Army captain, Meyers, and C.E. Tramposh, a burly Marine private who had been severely wounded at Wake. "Tramp" had no knowledge of medicine but was an eager learner. Before long he became the Chief's right-hand man. While one slept, the other worked. For months on end they labored—12 hours on and 12 off.

They tended the sick with the barest of inventories.

Umeda Bunsho had one Japanese army instrument kit containing a needle holder with a few needles, two scalpels, two hemostats, two thumb forceps, one aneurysm needle, and a little common thread for suture. They had brought some equipment with them but everything else had to be improvised.

An ordinary wooden table had to do for examinations, treatment, and operations. Their one sterilizer was a makeshift affair, fueled by charcoal, wood, or coal.(*1*) Small quantities of ether were available, but on one occasion, during an operation for empyema, the staff had to use procaine when the ether gave out.

They conducted some major operations with instruments made from materials pilfered from scrap metal piles. One prisoner had been fortunate enough to steal a portion of a microscope containing an eyepiece, drawtube, and a low power objective lens. Another patient constructed a wooden frame, stage, and a small gear knob. With this crude but functional scope, Meyers and Tramposh could do blood typing, cross matching, and examine stool samples for ova.

But Yankee ingenuity could carry them only so far. Many operations were just too complex for the austere Umeda Bunsho hospital.

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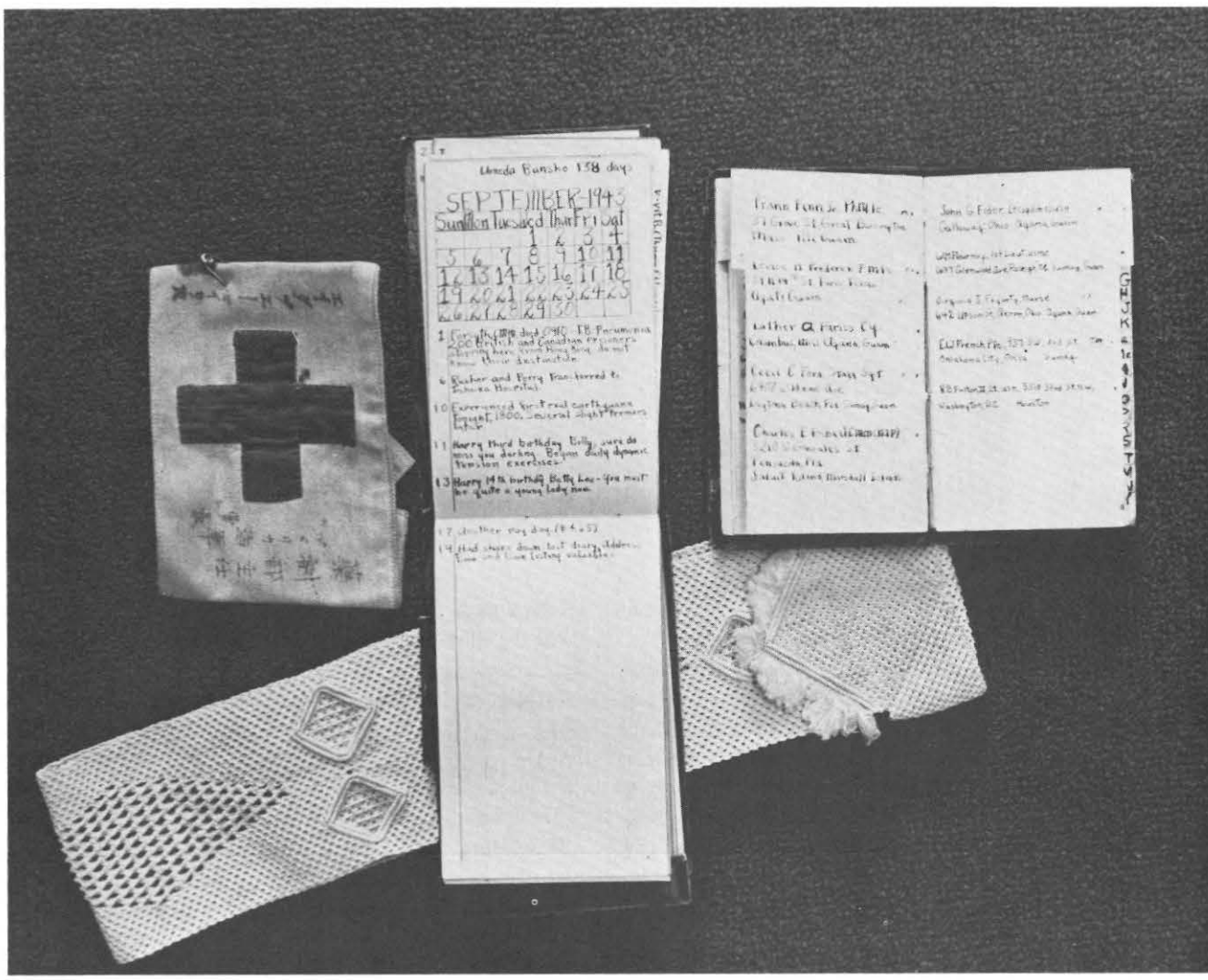
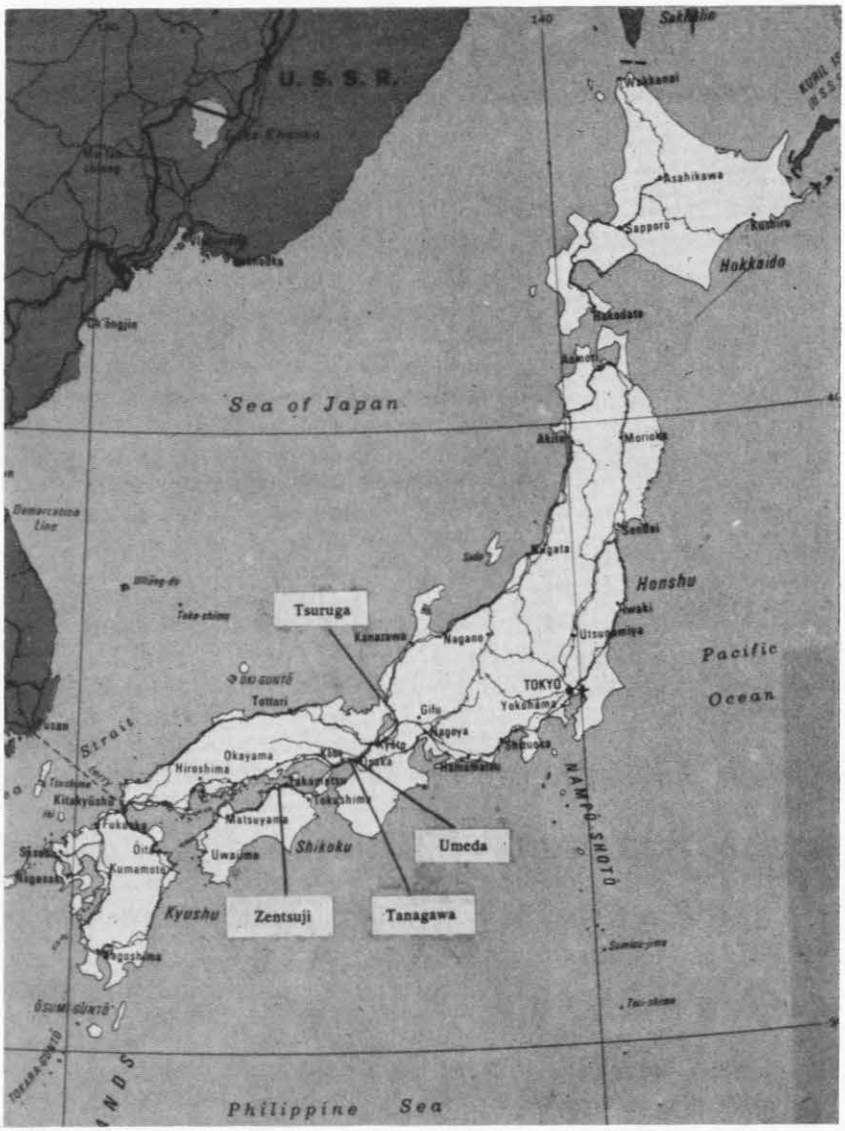
7 August 1943

Wheeled Gahan back from Hospital in cart; 10 K.M. He had herniotomy.

With increasing frequency, the Japanese allowed Meyers to take the more seriously ill and injured to Osaka for treatment. Hernias and broken limbs were



Chief Meyers' diary, address book, armband, and one of several belts he wove while in captivity.



commonplace due to the heavy work the men were forced to do in the freight yards.

The Chief took his patients to the downtown hospital in a two-wheeled handcart through the crowded Osaka streets. He could witness the operations but could say nothing as he watched the Japanese doctors violate sterile technique on numerous occasions. They never used rubber gloves. When the treatment was completed, he slowly wheeled the patients back to the bunsho over the same bumpy streets. Because the stairs at the camp hospital were so narrow, he often had to carry his charges upstairs in his arms.

One patient, a chief storekeeper with a fracture of both bones in one of his legs, required X-rays. With another man aiding him, Meyers carried the large man several miles to and from the hospital piggyback.

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15 October 1943
Elected Sec-Treas. of Welfare Board.

Practicing medicine at Umeda was always complicated by a lack of drugs. During the harsh winter of 1943-44, the pneumonia and tuberculosis rate soared. Because the Japanese were themselves running short of food and medicine, little was left over for the prisoners.

Chief Meyers talked to several of the prisoners about the need for obtaining sulphapyridine. In short order they formed a welfare committee, electing him secretary-treasurer, and delegating him the authority to purchase whatever drugs were necessary.(*2*)

He got 100 percent cooperation from the camp inmates. The men bought medicine through friendly Japanese civilians who procured it at drugstores near the work detail sites. The medicine was then smuggled into camp.(*3*)

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14 February 1944

Brown, R.M., SK3/c died 0730, Pneumonia. Escorted remains of Smith to crematory.

But even with the new system, proper medicine was often hard to obtain outside, and the medical staff had to rely on what the Japanese prison officials provided. Tanaka, a civilian in charge of the medical storeroom, refused to cooperate with the Americans. The Chief pleaded for medicine to treat his men to no avail. In desperation, he finally broke into the storeroom but it was too late for SK3/c Brown. A month later he again burglarized the storeroom but this time he was in time to keep another patient alive.

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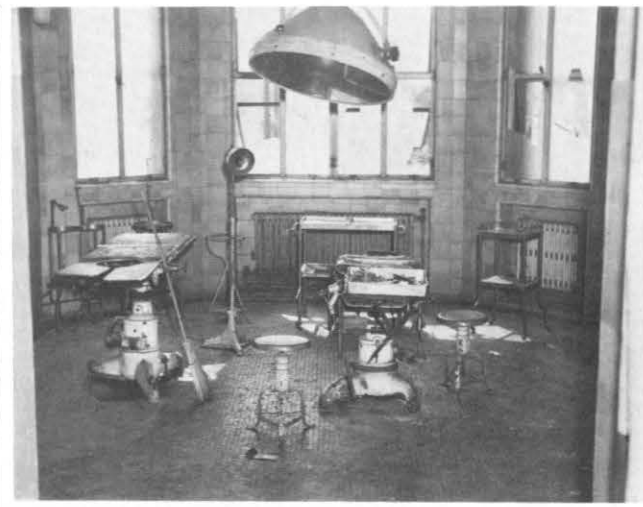
29 June 1944

Went to hospital with Capt. Friedman, Rusher and Frazier. Capt. Friedman ground my tooth down. Dr. Nell and I had our faces slapped—not at attention at evening tenko—indian wrestling.

Medicine bottles were often concealed under barracks floors. —Isabell C. Meyers



Seriously ill POW's were sometimes treated in Japanese hospitals. This is an operating room of a hospital in the city of Nakatsu. —Isabell C. Meyers

Punishment at Umeda Bunsho was an everyday occurrence and was meted out for such infractions as unauthorized smoking, smuggling, possession of contraband food, refusal to sign "no escape" pledges, and displaying a "bad attitude."

Face-slapping was common and brutal beatings with split bamboo sticks were all too frequent. One night a Japanese medical sergeant beat a machinist's mate for 45 minutes, knocking him down six times. When Chief Meyers tried to intervene, he too was struck.

Meyers' persistence in pleading for drugs, and his dedication to his men earned him the ill will of another Japanese guard named Yamada. Violence erupted almost every time they crossed paths. Yamada once forced the Chief to stand at attention in the hospital while he beat him repeatedly, first with his hand and then with a wide leather belt. Meyers sustained a badly cut face and a broken nose as a result. When he recovered, he was back asking for more medical supplies. The other guards respected him for his tenacity; more often than not he began to get what he needed.

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13 March 1944

Free-for-all at Umeda; Whitby, Turner and Muchie in brig.

Beatings and hazings, as common as they were, could not break the inmates' spirit. Defiance always simmered beneath the surface. One day it erupted at a work detail near the camp. A Japanese civilian em-

Christmas in camp—Umeda Bunsho 1944 —Isabell C. Meyers

ployee made the mistake of slapping a Marine prisoner. The much larger man struck back unexpectedly with the full force of a roundhouse blow that sent his tormentor flying through the air. Before long, a full-scale brawl was in progress. With their backs against a wooden building to protect their rear, three Marines fairly whipped almost 80 Japanese, John Wayne style. Even though the prison commandant finally put a stop to the fracas and had the Americans locked up for a few days, the victory was a great morale booster for the camp. From that point on the Osaka civilians treated the prisoners with a bit more respect.

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24 October 1944

Brendlinger, MM1c died 0530, diarrhea and malnutrition. Heard I have a letter at Hdqtrs. Weigh 55.5 Kg. [122 pounds]

The winter of 1943-44 at Umeda was particularly hard. The Japanese grain harvest had run its course by that time and even stealing food from the freight yards became difficult. Those who didn't have bronchitis, pneumonia, or tuberculosis were certain to have beriberi or some other deficiency disease. The Chief's weight fluctuated but generally moved downward. He rarely ate a full ration, almost always saving some of his food to feed the patients. Tramposh did likewise.

In the rest of the camp, hunger dominated every action. The inmates thought it, dreamed it, and lived with it 24 hours a day.(*4*) The risks of being caught stealing food seemed to be a small one to take when faced with starvation.

Men began eating anything remotely edible—beetles, snakes, silkworms, rancid copra, fodder stolen from horses' feed buckets. They stole chickens and, in the relative privacy of the latrine closets, tore the live birds apart, hungrily gnawing the warm flesh from the bones. One night the commandant's cat provided the evening meal for several inmates.

Japanese civilians were not universally hostile to the

Americans; decency and compassion often coexist with the hatred of war. In at least one instance, Chief Meyers' gaunt appearance stirred a Japanese woman's pity. She slipped him several fish pies at the risk of her own life.

By necessity, theft became a way of life. The food the men pilfered from the railroad cars during working hours they hid in their clothes until they returned to the bunsho. Getting it past shakedowns and body searches was difficult and many were caught and punished. But enough was cached in hollow spaces between the walls of the barracks to sustain the men. It also proved to be useful barter to bribe the guards, who were themselves on short rations.

As time went on life at this camp too began to improve. The men organized into a tight-knit group that carefully planned for the welfare of the camp. Selected Japanese guards were offered rice from the hidden stockpiles and in return either looked the other way during the frequent shakedowns for contraband, or tipped off the men when a search was scheduled.

Guards and civilian employees were not only bribed but often blackmailed as well. It worked like this. An inmate would offer a bribe which would almost certainly be accepted. Other prisoners would then confront the guard or civilian and threaten to expose him to the camp commandant. Such an accusation would be investigated and arrest and execution could follow. Needless to say, the Americans soon had many Japanese working for them.

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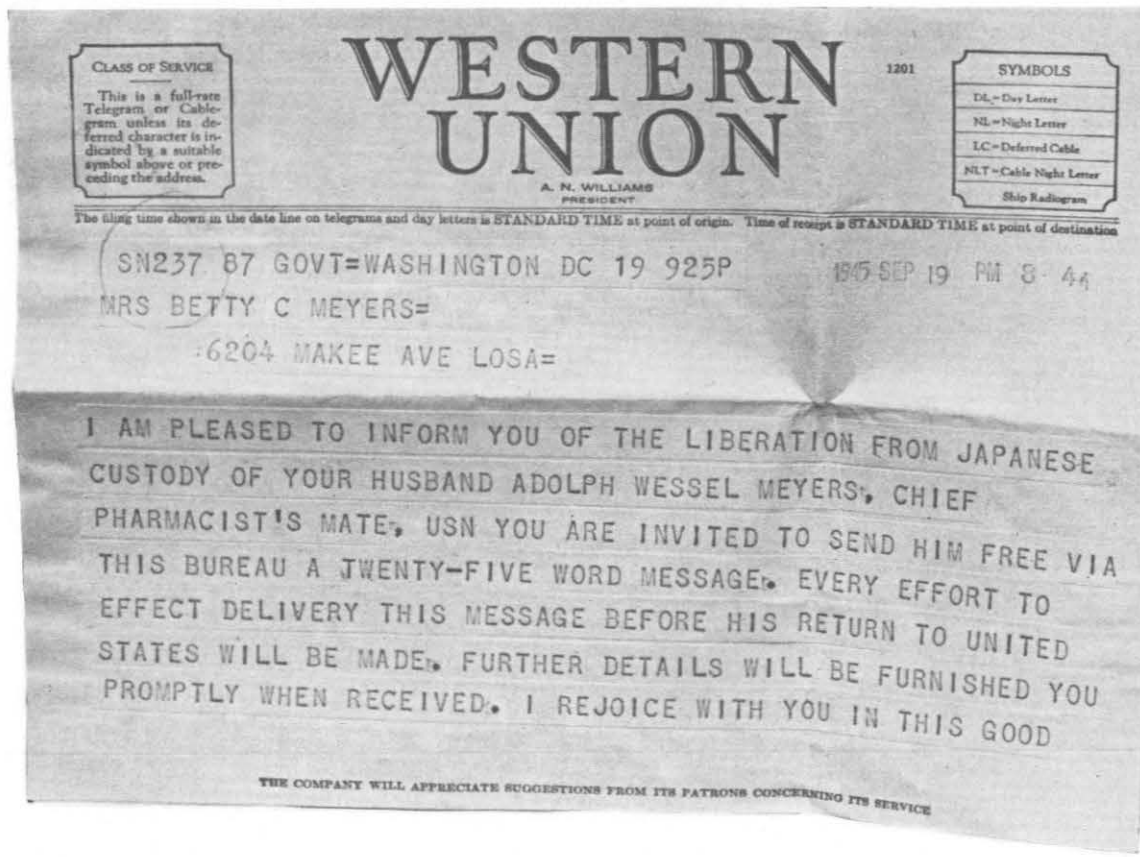
1 August 1944
General shakedown.

One of the most feared events in the camp was the general shakedown. The commandant and often a high-ranking Japanese officer and the accompanying entourage of guards would come through the bunsho searching for contraband—food, weapons, and newspapers. They would often confiscate personal papers, note-



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MRS BETTY C MEYERS=

6204 MAKEE AVE LOSA=

I AM PLEASED TO INFORM YOU OF THE LIBERATION FROM JAPANESE CUSTODY OF YOUR HUSBAND ADOLPH WESSEL MEYERS, CHIEF PHARMACIST'S MATE, USN YOU ARE INVITED TO SEND HIM FREE VIA THIS BUREAU A TWENTY-FIVE WORD MESSAGE. EVERY EFFORT TO EFFECT DELIVERY THIS MESSAGE BEFORE HIS RETURN TO UNITED STATES WILL BE MADE. FURTHER DETAILS WILL BE FURNISHED YOU PROMPTLY WHEN RECEIVED. I REJOICE WITH YOU IN THIS GOOD

THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

The joyous news of a POW's liberation. —Isabell C. Meyers

Three of Chief Meyers' newly liberated comrades discuss their experiences with the crew of an evacuation plane as they prepare to leave Japan. The three pharmacist's mates were captured with him during the invasion of Guam. —National Archives

books, and diaries and the prisoners would be forced to watch the items burned.

Chief Meyers once had his diary and address book taken at Zentsuji but had them returned several days later. At Umeda during the summer of 1944, the confiscations started again. This time the Chief knew he would never again see the journal he had so meticulously kept. Shortly after his last entry on 25 August, he gave the document to a Japanese who had befriended him. The man was the chief interpreter for the colonel of the entire Osaka prison system and was secretly pro-American, having lived in Hawaii before the war. Mr. Hyashi (no relation to the medical sergeant of the same name) took the diary home for safekeeping and gave it to a Marine lieutenant after the war was over. It was later used to verify the fates of POWs that had been reported to have died in captivity. During several post-war trials of Japanese war criminals, it was submitted as evidence.

Although the diary ended in August 1944, Chief Meyers and the others remained in prison for another year. If starvation and disease were not enough, they now faced sudden death from the skies as the war came to the Japanese home islands. On 13 March 1945 American B-29s hit Osaka, destroying factories and docks. In early May they came again. Jack J. Madison, Motor Machinist's Mate Second Class described what happened: "They bombed right up to the camp door. Some of us sat on the roof and watched the fires. The next day they moved us out. But evacuation was rather difficult. We had four trains bombed out from under us. We had American lookouts on top of the train and when they shouted, we all hit the ditch. There were only four Nip soldiers for the entire train. They weren't worried about our running off, because if we were found more than a mile from where we were supposed to be, they just shot us. They were always ready to shoot Americans." (*5*)

Madison's train was headed for a prison camp in western Kyushu near Nagasaki. On 9 August he would witness and survive the atomic destruction of that city.

Meyers' train was destined for the city of Tsuruga, about 75 miles northeast of Osaka on the Sea of Japan. Although the Japanese told the prisoners that the new camp would be safer, they found their new quarters to be an old factory near the docks and a definite military target. Nevertheless, they suddenly found themselves in possession of more medical supplies than they had seen since their capture.

As might be expected, it wasn't long before the bombers appeared, led by a lone four-engine silver ghost marking the blue sky with wispy, white contrails. Waves of B-29s followed. On 13 July 1945 Tsuruga was three-quarters destroyed. Several direct hits completely leveled the camp. One bomb tore through the factory roof and obliterated the bed Meyers had occupied that morning.

The Japanese moved the prisoners to a warehouse on the docks where they slept on dirt floors. The flies and bugs were almost unbearable.

Two weeks later on 30 July, a formation of about 40 Grumman fighters and dive bombers swept in, pounding the dock area with fragmentation bombs and machinegun fire.

The next move was to a nearby brick factory not far away and adjacent to a cotton mill. On 8 August a lone B-29 dropped a 1000-pound bomb squarely on the mill causing considerable damage and showering the camp with debris. Few inmates were seriously injured but many young girls working in the mill were killed and injured.

Japanese authorities sent for the camp's medical personnel to help with the injured. Chief Meyers did what he could for the survivors and so impressed the Japanese that they decorated him. His hero status was short lived. Three days later they took away his decoration and beat him for his so-called bad attitude.

It was his last beating. The guards suddenly became overly friendly and solicitous, offering food and favors, and issuing new clothes every day for a period of three days. The mistreatment and the work details stopped. Rumors that the war was over swept through the camp. The Japanese told the inmates to paint "PW" on the roof of the factory.

The B-29s came again, but this time when the bomb bays opened, bundles dropped out slung beneath brightly colored parachutes or merely padded to protect them against impact. The men rushed headlong into the rice paddies where the packages had landed and fell upon them with relish. Some containers had broken open, spilling the contents in the mud. No one seemed to mind. There were steaks, candy, cigarettes, canned meat, sugar, newspapers, and medical supplies. One bundle was a complete field outfit with instruments, medicine, splints, gauze, tape, and emergency equipment.

Tsuruga's inmates, almost insane with joy, gorged themselves on the first American food many had seen in almost four years. The war was indeed over yet there were to be no reprisals against the camp administrators or the guards. Military discipline remained intact as the POWs awaited their liberators and the journey home.

On 2 September 1945, as the Articles of Surrender were being signed aboard the battleship *Missouri* in Tokyo Bay, survivors of Guam, Wake, Corregidor, Bataan, Zentsuji, Tanagawa, Umeda Bunsho, and

LT Adolph Wessel Meyers receiving the Bronze Star —Isabell C. Meyers

Tsuruga gathered for a moving ceremony of their own. From parachute silk and rags, the men had lovingly fashioned an American flag. As the Stars and Stripes were raised over the prison compound, Chief Pharmacist's Mate Adolph Wessel Meyers and his comrades watched, heads high, tears of pride streaming down their faces. Freedom was at hand.

After liberation by the 8th Army on 10 September 1945, Meyers remained behind for several days caring for the sick. He then left Tsuruga by train for Yokohama and home. After a stopoff in Guam for a physical exam, he flew on to California for a joyful reunion with his family.

He remained in the Navy, was awarded the Bronze Star for his wartime service, and retired as a commander for reasons of health in 1953. He earned a B.A. degree in electronics and learned to fly single and multi-engine aircraft. He died in 1958 at age 53.

The citation that accompanied his decoration best summarized his heroism:

". . . Serving under adverse conditions and without discrimination, Lieutenant, Junior Grade Meyers skillfully ministered to all of his patients and, because of his insistence that the sick be given proper medical care, frequently received severe punishment from the Japanese. Disregarding his own illness . . . [he] served his fellow prisoners with courage, fortitude, and a gallant spirit of self-sacrifice, thereby saving the lives of many who would otherwise have died."—JKH

Notes

1. ibid. 93.
2. The Japanese paid the prisoners token wages, hoping to avoid being accused of using their POWs as slave laborers.
3. Marek, 95.
4. ibid. 35.
5. Karig, Walter, et al., *Battle Report: Victory in the Pacific,* 505.

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Where Navy Divers Learn Their Trade

There is a flurry of activity aboard the white, steel diving barge moored at the Washington Navy Yard. Crew members make last minute checks; hoses, communication lines, and fittings are secured. Nearby, a diver, already suited up in a Mark 12 rig and resembling an astronaut, cautiously descends the overboard ladder. Moments later, the top of his fiberglass helmet slips beneath the chocolate-brown surface of the Anacostia River.

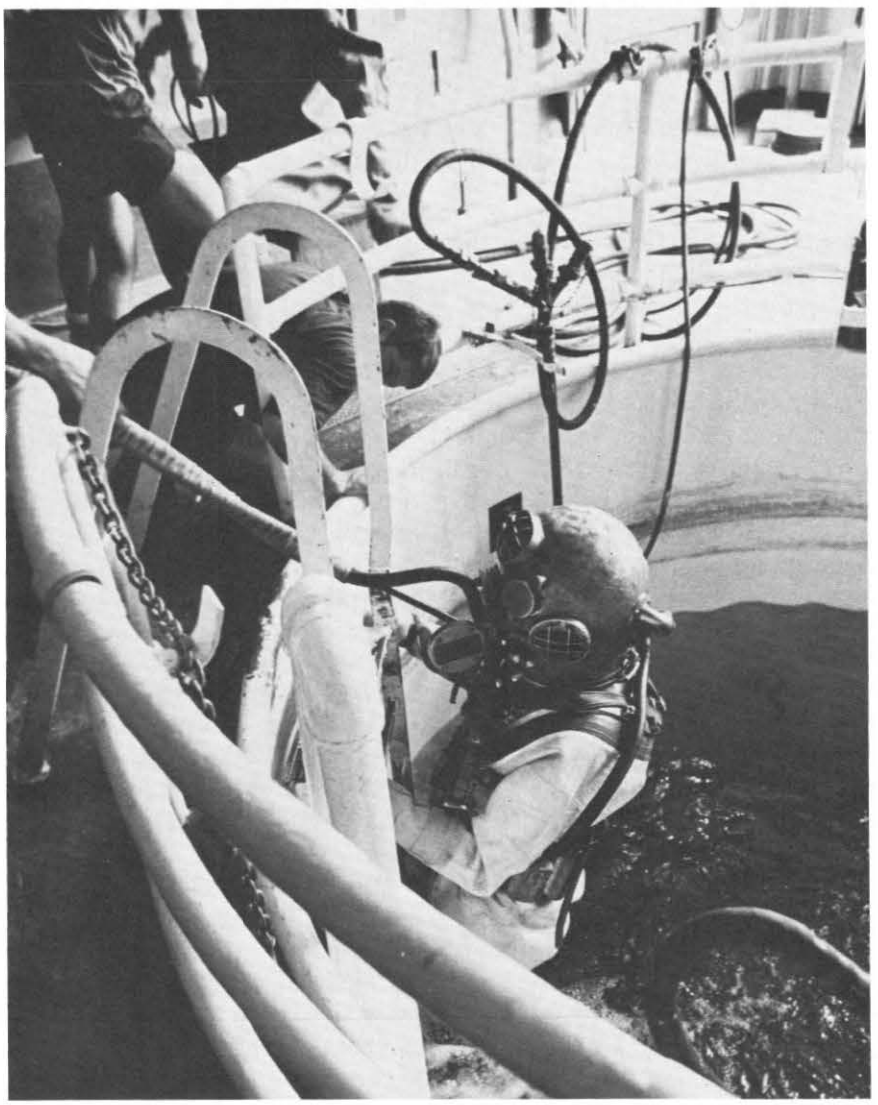
The diver and crew are students at the Navy School of Diving and Salvage in Washington, D.C. This day, each of them will take a turn performing an underwater task at a 25-foot depth. The job calls for the disassembly and reassembly of a submerged pontoon. The students must remove two flanges and two gaskets, send them topside for verification, and then reassemble the pontoon on the river bottom. This task is similar to jobs they will do when they become qualified Navy divers serving with the fleet.

Inside the school's main building, students in different phases of training are learning other skills. The second floor, where most of the activity is taking place, is a maze of chambers, pipes, tanks, and pressure complexes where deep dives can be simulated, and if necessary, where divers can be treated for decompression sickness.

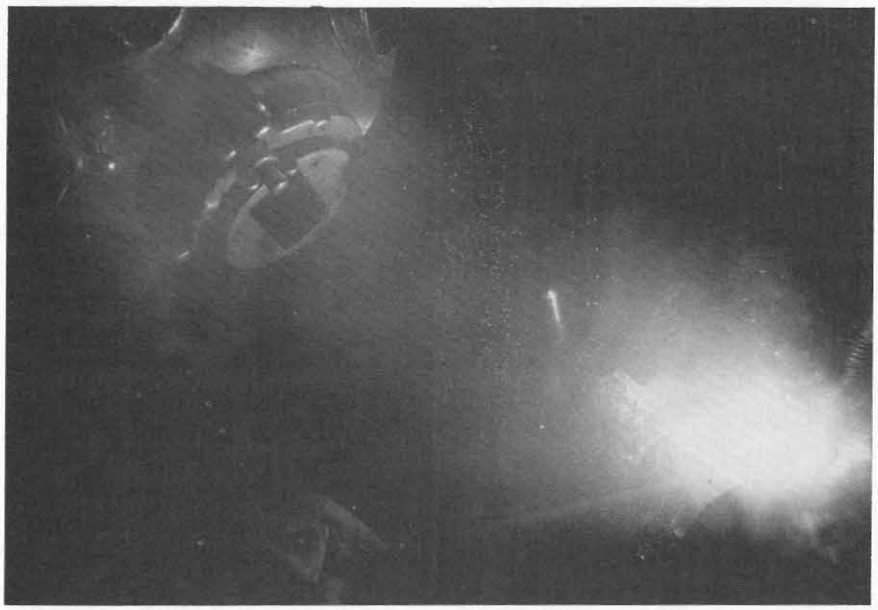
Two open, eight-foot diameter cylindrical tanks ascend from the main floor 15 feet through the ceiling to the floor above. In these tanks fledgling divers practice SCUBA or perform tasks such as cutting, welding, or using tools under the watchful eyes of the instructors.

In two remaining sealed tanks, students in SCUBA are making their 130-foot qualification dives. Those who are not diving are engaged in support activities, tending the air hoses and communication lines or suiting and undressing other divers.

The Navy diving program, of which the School of Diving and Salvage is a part, trains divers in all basic and advanced diving tech-



A student diver in a Mark 5 rig descends the ladder into one of the school's two open tanks.



An incandescent welding rod illuminates a student diver's helmet.

niques. Second Class divers, the first skill level in the deep sea diver program, go through a 12-week program of classroom instruction and actual diving. They learn SCUBA, Mark 5 (hard hat, surface supplied air), Mark 1 band mask (light weight surface supplied air), and the Mark 12 (modern surface supplied hard hat equipment). The Second Class curriculum also stresses physical fitness, diving physiology, basic equipment use and maintenance, salvage, underwater cutting and welding, and the use of other underwater tools.

Once a student diver earns designation as a Second Class diver, he usually is assigned to the fleet aboard either rescue or salvage ships (ARS), or submarine rescue ships (ASR). Second Class divers are also assigned to auxiliary fleet tugs (ATF), destroyer tenders, submarine tenders, harbor clearance or repair ships, and shore billets in naval ship yards. First Class divers are qualified in mixed gas and for advanced training in saturation deep diving. They can be called upon to dive in deep submerge rescue vehicles (DSRV). Other First Class divers fill billets in the Navy's research facilities.

The 17-week First Class diving course reviews air diving techniques and teaches mixed gas diving using the Mark 5 MOD 1, Mark 1 band mask, and the Mark 12 helium-oxygen supplied equipment. Students learn advanced skills such as propeller changing, valve and flange removal, and advanced underwater welding and demolition. They also hone their supervisory skills. Upon graduation, a First Class diver may, as the senior enlisted diver, be in charge of a ship's diving locker and supervise all other divers.

Master diver is the pinnacle of an enlisted diver's career. Candidates in paygrades E-7 and above with a minimum of two years' experience as either a First Class or saturation diver may apply for the five-week Master diver evaluation. Selectees are assigned as Master divers in a variety of diving vessels and shore billets.

Completing the Second or First Class schools at the Navy School of Diving and Salvage is no pushover. The academic curriculum and the tough physical conditioning are often too much for the undisciplined. Thirty-five percent of those who begin the Second Class school never finish. Some find they are claustrophobic or just plain uncomfortable in a diving suit. Others find the rigors of dragging a 200-pound suit up and down a ladder too demanding. Most discover that Navy diving is hard work and not what they remember from "Sea Hunt" or the Jacques Cousteau specials. Rarely do Navy divers enjoy the luxury of swimming amidst tropical fish in warm, clear waters. More often they conduct their business in polluted harbors or in cold, murky conditions with zero visibility.

What, then, is the incentive for becoming a Navy diver? The job can be as rewarding as it is demanding. Divers who graduate from the Navy diving schools at San Diego, Little Creek, Va., Pearl Harbor, and the Washington Navy Yard are highly trained professionals and receive additional monthly pay based on their levels of expertise ($65 for Second Class divers, $100 for First Class divers, $110 for Master divvers, and $210 for saturation divers.

Many divers find they are more comfortable in the water than out. HM2 Stephen R. Featherston (see p. 14), a corpsman-diver and an instructor at the school, finds almost any job more challenging when done underwater.

The Curriculum

The First and Second Class schools offer a practical blend of lecture and actual diving experience. After a vigorous hour of morning PT that includes a 2-5-mile run, the students begin their education for the day. The Second Class trainees first

The Equipment

Physical strength and stamina are prerequisites at the diving school. Most of the deep diving equipment with the exception of SCUBA and the other light-weight rigs is cumbersome and extremely heavy. The helmet and breastplate of the Mark 5 air rig, designed for depths to 285 feet, weighs about 54 pounds. The deeper diving modification of the Mark 5 that utilizes a helium-oxygen ($He0_2$) breathing mixture contains a recirculating system that adds still more weight. The helmet, breastplate, and recirculator for this $He0_2$ rig weigh 109 pounds.

Add another 84 pounds for the weight belt, 18-20 pounds for the rubber-canvas suit, 17.5 pounds apiece for the Mark 5 air rig shoes, and the diver is hefting nearly 200 pounds of suit. The Mark 5 MOD 1 $He0_2$ suit weighs an additional 100 pounds. Making headway with either of these rigs, even underwater where buoyancy reduces the weight, is a formidable task. Three-fingered pressurized gloves and a helmet that looks like a goldfish bowl with prison bars and sounds like a wind tunnel make even the simplest tasks seem gargantuan.

Fortunately, Navy divers have the space age to thank for the new Mark 12 diving system. The Mark 12 is really two suits. The one-piece rubber inner suit is very much like a wetsuit. The blue outer suit is two layers of nylon. It protects the inner suit and has pockets that hold the weights. The fiberglass helmet weighs 37 pounds but is virtually weightless in the water. The shoes vary in size from 1-4 and have a five-pound negative buoyancy. In fact, the buoyancy control is so good in the Mark 12 that the diver can hover, a feat nearly impossible to perform in the Mark 5. The total weight—inner and outer garments, boots, gloves, weights, and helmet—is about 127 pounds.

The Mark 12 weight savings is one advantage. Design is another. The helmet is quiet and free from the distracting hissing experienced by Mark 5 divers. The communications system is excellent as is the unobstructed view through the nine-inch-square forward viewport.

The old (Mark 5-left) and the new (Mark 12-right)

The Mark 12 air system has already been approved for fleet use. The suit's recirculator for mixed gas and its cold water capability are still being tested. The new suit can be used at depths equal to the Mark 5 and its superiority will eventually relegate the older rig to the marine antique shop and the museum. More significantly, Navy divers, particularly women, will no longer have to rely on brute strength to make the team.

learn SCUBA. This involves two weeks of classroom instruction and two weeks of diving. They also learn to use decompression charts, an essential requirement for conducting deep dives.

In the classroom, the students learn diving physics, diving medicine, and basic first aid. They become familiar with dangerous marine life and learn to recognize and avoid in-water hazards.

The divers then get their first taste of deep diving when they meet the basic Mark 5 air system, a rig that has been in use over 60 years. This training includes a week of orientation in the tanks, a week of river diving from the barge, and then another week in the river with the lighter and more modern Mark 12. They also learn basic cutting and welding and to use underwater tools.

The First Class school concentrates on mixed gas diving. This begins with an HeO_2 orientation followed by two weeks of pressure complex dives, instruction in advanced underwater medicine, two weeks down the Potomac near Dahlgren, Va., where the students qualify for open sea deep dives. The training stresses sophisticated equipment such as the submarine rescue chamber and hyperbaric chamber operation and maintenance. The First Class diver candidates learn to mix and split gas, prerequisites for deep diving.

The Medical Deep-Sea Diving Technician (HM-8493)

What's in diving for the Navy corpsman? Because every diving command must have a nondiving or diving corpsman, there are numerous opportunities. In fact, present manning for diving med techs is about 55 percent, well below the demand.

The primary responsibility of the corpsman-diver is to aid in the treatment and care of other divers. The BUPERS description of these responsibilities is more concise. The Medical Deep-Sea Diving Technician (HM-8493) "assists the medical officer in the prevention and treatment of illnesses associated with deep sea diving in high pressure conditions. Operates pressure chamber and submarine rescue apparatus. Enters pressure chamber to care for patients suffering from decompression sickness. Performs diving and other duties related to underwater rescue."

To effectively perform these tasks, the corpsman must be trained as a diver and that training is essentially the same as for other divers. At the Washington Navy Yard, corpsmen go through the Second Class school and then, instead of heading for a fleet assignment, go right into First Class training. Upon graduation, the corpsman-diver is truly a specialist in two fields. He can handle an underwater cutting torch as easily as he can a needle and suture. —JKH

Personnel interested in obtaining additional information on the Medical Deep-Sea Diving Technician program should contact the corpsmen detailer (NMPC 407 C). Telephone: Commerical (301) 427-5698, Autovon 291-5698.

Applications for Navy Medical Department advanced specialty training programs should be submitted in accordance with BUMEDINST 1510.10D.

A Corpsman-Diver Speaks Out

HM2 Stephen R. Featherston is a corpsman. He is also a First Class Navy diver and an instructor at the Navy School of Diving and Salvage at the Washington Navy Yard. Before becoming a diver last year, HM2 Featherston was an Army medic and later saw duty in the Navy as an emergency room technician at NRMC Oakland.

Diving has always been his first love, and Featherston readily admits that he finds any job more challenging underwater than on dry land. As a corpsman-diver, he has combined the best of both environments. He teaches light weight diving, diving medicine, and hyperbaric chamber operation. Mixing and splitting of gas and hyperbaric chamber maintenance, two of the other jobs performed by corpsmen in the fleet, are also taught at the school.

U.S. Navy Medicine recently talked to HM2 Featherston about his favorite subject. Here are some of his comments.

USNM: Why are there so few corpsmen-divers in the Navy?

HM2 Featherston: Many corpsmen come into the program but not many graduate. Many come for the wrong reasons. When they get here they find that diving school isn't really what they wanted. It's a very physical school. Many corpsmen are corpsmen because they like a clean, sterile hospital environment and being involved in medicine. They get here and find that they are divers primarily and corpsmen secondarily. Navy diving is hard, dirty work. It's not all SCUBA—going out in clear water and playing around. A lot of Navy diving is done in har-

bors with zero visibility and polluted water. It's not always a lot of fun.

What made you decide to become a diver?

I wanted to get out of the hospital atmosphere. I also like being in the water. Everything I do in the water is more fun than doing it on the surface. Just putting a nut and bolt together underwater is a challenging experience.

How long is the combined school for diving corpsmen?

About 26 weeks. The normal progression for regular divers is: Second Class school, graduation, then an operational assignment to the fleet for a year. Then you come back to the First Class school. Corpsmen go through the whole thing at once. There are no Second Class corpsmen-divers. The Second Class school is 14 weeks. You then have a month layover for scheduling purposes and then the First Class school begins. This normally lasts about 17 weeks but it's shorter for med techs. Since they just graduated Second Class school, they don't need the refreshers those coming back from from the fleet might need.

What kind of training do you get as a diving corpsman?

Diving corpsmen go through the same training as First Class divers. They are mixed gas qualified (helium-oxygen), dive the same depths, and dive the same gear. The emphasis at this school is on safety and the buddy system—being able to take care of yourself in the water. It's rigorous, especially the confidence building.

Is that where they separate you from your gear in the pool?

Yes, they take all your gear away and leave you with your buddy and one set of tanks, no mask, no fins. It's good for the diver because you feel you can handle any emergency in the water.

Did you learn diving at this school?

No, I went through Second Class diving school at Little Creek and came here for First Class school.

Two tenders aboard the diving barge help a diver out of his rig. One of the men will then suit up for his turn on the river bottom.

What's the curriculum for the Second Class?

We have PT every morning for an hour or so. Then we undergo diving physics instruction for a week, a week of diving medicine, Mark 5 orientation, and SCUBA. You then get three weeks of Mark 5, two weeks of SCUBA, a week of working with underwater tools, and a week of cutting and welding.

What about the First Class school?

You learn salvage, demolition, and the use of HeO_2.

What duties does a diving corpsman perform aboard ship?

It depends on the size of the ship. On an ATS [Auxiliary Tug Salvage —a relatively new vessel in the Navy designed for salvage and towing], there is a sick bay usually manned by a nondiving corpsman. You might also work in the diving locker. As a diving corpsman, you might be assigned aboard an ATS, an ARS [Auxiliary Rescue Salvage], or an ASR [Submarine Rescue Vessel]. You would handle sick call and possibly assume some diving responsibilities. When you weren't diving or handling sick call, you would maintain or operate a pressure chamber or other undersea rescue apparatus.

There are many good billets open for corpsmen but not enough corpsmen to fill them. Hospitals have recompression chambers. At Bethesda, for example, they are opening up a new saturation system. They will need a lot of corpsmen to do experimental diving. If we get enough med techs in the diving community, they can rotate and, in the course of a career, a diver will get both sea duty and the kinds of billets I just mentioned.

What are some of the other benefits that attract people to the program besides the extra pay?

Corpsmen are all First Class divers. They get $100 a month extra. There's also the prestige of being a member of an elite group. I'm much happier as a diver than as an emergency room technician. If you want to be a diver, that's the way you have to feel when you come here. If you're not sure you want to dive, coming here is a big mistake. You really have to want to be a diver to pass this school.

A Prevention-Oriented Approach to Dental Office Emergencies

CDR Roger E. Alexander, DC, USN

Many articles have appeared in the dental literature in recent years on the subject of office emergencies. While most of these articles make passing references to the preventive aspects, most of the information is directed toward the diagnosis and management of the actual emergencies. Although, as Bell points out, it is impossible to predict which patients will experience an anesthetic or treatment related emergency, a significant number of emergencies can be avoided by prudent evaluations and common sense regardless of the patient's physical condition.(*1*)

Physiologic positioning (semi-reclining), improved office environments, improved drugs, and better trained dental officers are factors that have reduced the frequency of emergencies. In addition, the practice of preventing emergencies before they happen is extremely important. The most satisfactory treatment of an office emergency is the prevention of its occurrence!

It is inappropriate for the dental officer to close his eyes and avoid the topic of office emergencies, hoping they won't happen to him. McCarthy points out that dentists can be held liable for erroneous diagnoses, and/or inadequate preparation for handling of office emergencies.(*3*) Current legal trends, changing standards of care, an increasing population of medically-compromised patients on a wide variety of medications, and a tendency by the public to hold professionals accountable in the courts, have all contributed to a heightened awareness regarding this problem. A 1966 survey of dentists in one state revealed that only 75 percent of them had oxygen in their offices, and only 57 percent had ever used it.(*1*) Fifty-two percent had trained their office personnel to use oxygen. Only 69 percent had an important resuscitation drug (epinephrine) in the office while 95 percent had a drug of questionable efficacy (spirit of ammonia). A more recent survey of oral surgeons revealed that 100 percent of their offices had oxygen available.(*7*)

The philosophical foundation upon which this prevention-oriented approach is built consists of 10 axioms. Some are self-evident, but complete understanding of each is critical.

AXIOM 1—The Role of the Dentist. In an office emergency, the general dentist must properly diagnose the problem, activate an emergency medical response system, and maintain basic life support until medical help arrives and takes over. In other words, the "ABC's" take priority over "D" (for drugs). This approach is based on the assumption that each dentist and every auxiliary is fully trained in cardiopulmonary resuscitation.

AXIOM 2—Office Standards. The following questions should be asked whether the facility is an independent duty station or a large clinic:

- Is emergency oxygen available?
- Are all patient medical histories taken and reviewed?
- Have all doctors and auxiliary personnel been certified in CPR and drilled in the management of office emergencies?

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The author acknowledges the contributions made by CAPT J. McMahon, DC, USN and CDR R. Cook, DC, USN in the initial design and construction of the prototype for the emergency board and cart system recommended herein. Although the author modified the original system and improved the unit, the original concept was not his.

• Are emergency drugs and equipment available and in good working order?

• Has backup medical support been pre-arranged for activation, if needed?

AXIOM 3—Risk Factors. Military dentists have an advantage. Most patients seeking treatment are young, healthy, not on medications, and have recently undergone medical evaluations. The risk factor is markedly reduced. When called upon to treat retired or dependent patients, however, the index of caution must be much higher and the evaluations more detailed. Occasionally, as Mosby points out, emergencies will arise in either group, even if we take precautions to avoid them.(*4*)

AXIOM 4—Drugs. Any doctor administering a drug should be familiar with it and use the least concentration/dosage that is effective. When administering a drug routinely, the dental officer should be fully familiar with its pharmacology. The need to reduce dosages when treating children is a somewhat self-evident fact that must always be considered. For example, if the patient is a 10 kg child (22 lbs.) and the anesthetic is 3 percent Mepivicaine, a toxic dose may be approached after only one carpule of anesthetic is administered. A useable rule of thumb for dosage adjustments is .7 x weight (lbs) + 10 = percentage of adult dose to be used.

Another important matter to consider is the tendency to administer an unnecessarily large anesthetic dose. Rarely is it necessary to inject more than 5 carpules, and this amount usually is required only when extensive surgery is to be performed. A satisfactory degree of vasoconstriction can be achieved with a concentration of 1:100,000 Epinephrine, a fact which is not always appreciated by clinicians. A solution of anesthetic with 1:50,000 concentration of Epinephrine should only be used with the understanding that there is an increase in risk, particularly in the patient with cardiovascular disease.

AXIOM 5—Preoperative Evaluation. A major aspect of prevention is preoperative evaluation, coupled with some plain old horsesense. This approach has been summed up nicely in an article entitled "Never Treat a Stranger."(*5*) Every patient that sits in a dental chair should have a written medical history which has been reviewed, annotated, and signed by the doctor. Subsequently, it should be frequently reviewed and updated, as indicated by individual circumstances.

Every dental office should have a stethoscope and sphygmomanometer, and every dental patient over the age of 25 should have a blood pressure reading taken before appointments. Hypertension is an extremely common undiagnosed medical condition.

Each office should have basic drug publications for referencing. Among the common references found are the *Physicians' Desk Reference,* the American Dental Association's *Accepted Dental Therapeutics,* the American Pharmaceutical Association's *Drug Interactions,* and *Facts and Comparisons.*

AXIOM 6—Patient Management. Patient rapport is very important. The key to successful patient management is DDS—Decorum, Diplomacy, Semantics. Avoid sensitive words and use more soothing alternatives, such as discomfort, pressure, oozing, etc. Words which reflect the difficulty of the procedure or the doctor's ability are avoided. Patients should be forewarned about the unfamiliar sensations and noises that they may experience. It is even helpful to employ some tasteful humor to help set the patient at ease.

AXIOM 7—After Hours Treatment. Minimal after-hours treatment is recommended. In such a situation, the dental officer is placed in the potential position of having an emergency without the immediate availability of the type of support that would be available during the regular working hours. There are very few dental emergencies that cannot be managed pharmacologically until the next morning, when other doctors and personnel will be available. Naturally, if the situation demands immediate intervention, prudent treatment is rendered; if not, defer treatment to a more appropriate time.

AXIOM 8—Have a Plan. The time an emergency happens in the office is not the most opportune moment to begin reading instructions on how things work, researching signs and symptoms, or checking to see whether oxygen tanks are full and the emergency drugs up-to-date. First, establish a routine on paper that will fit your office scheme, and then implement it. Work with your office staff to smooth out the response, and then periodically challenge your staff with drills. Establish a visual or audible signal that alerts area personnel to the occurrence of an emergency and delegate responsibilities for bringing oxygen, drugs, calling for medical assistance, etc. Advance arrangements should be made with a nearby clinic, willing and able to respond. Discuss your plans in advance and solicit recommendations from the physician. You will find greater willingness to help out if and when you have to call for backup assistance. Emergency numbers should be posted by each telephone, including your address (in case a pa-

tient or out-of-town person winds up making the call, and is not familiar with your location).

AXIOM 9—Emergency Drugs. There are many ways in which to keep emergency drugs in the dental office—tool boxes, tackle boxes, attache cases, boards, carts, trays, and even locking plastic bags. The emphasis should be on accessibility. One absolute necessity is oxygen, the most important emergency "drug" of all. A minimum of a 45-minute supply, and ideally more in backup tanks should be available. The system should have positive pressure ventilation capabilities. Disposable masks, nasal cannulae, face cups, etc. are inadequate for dealing with emergencies! The Ambu-type bag/mask combination is very popular; the Elder-type demand valve system is excellent, but requires extremely high flows of oxygen, which can rapidly deplete a system that employs a solitary, small tank. Oxygen tanks should be checked weekly, even if a central system is used. An empty oxygen tank is a poor partner in a rescue attempt. Emergency drugs should be reviewed every three to six months, to assure they are not out-of-date. Date the entire kit with the review date for future reference.

AXIOM 10—Cardiopulmonary Resuscitation. Sudden cardiac collapse from whatever cause, medical or office emergency, is not uncommon. Last year, over one million Americans had heart attacks, and 65 percent of them died, many before even reaching a hospital. With millions of cardiovascular-diseased patients and an estimated 24 million hypertensives, there is a real potential for patients to have a serious problem, particularly the more elderly. It is therefore essential that dentists be knowledgeable in the life-saving aspects of cardiopulmonary resuscitation—or more correctly—basic cardiac life support. We have an obligation to save lives, not only in our offices, but in our homes and on the streets. Several states now demand CPR certification for licensure and relicensure, and others are considering it.

CPR is the bottom line; it is the foundation of life support on which everything else depends. It is the single most important first aid technique you can have in your office emergency armamentarium and should be a fundamental requirement for all dentists and all auxiliary personnel. Although it is the cheapest part of the emergency setup, an appalling number of offices have not included CPR training in their protocols. Going beyond the value of such courses in coping with office emergencies, several doctors are alive today because their office staff knew CPR and were able to save their doctor!

The Emergency Drug Kit

With this foundation of prevention and preparation, attention is now directed to an oft-perplexing area, the emergency drug kit. The kit should be simple and understandable. Drugs should be visible and separated. Don't rely on memory remaining intact under stress. Utilize some type of placard or label with each drug, giving dosages and quantities to be administered. Some form of breakable seal will be necessary to detect unauthorized break-ins. Do not, however, use a lock which requires fumbling for keys or remembering combinations.

The kit I now prefer is very basic and simple. It consists of an immediate response board containing the essential primary drugs. It is bolted to a mobile support/backup cart (Figure 1). Additional items in the area are an oxygen cart (with AMBU bag) and a cardiac arrest spine board.

Primary Emergency Drug Board

Most emergencies can be initially managed with between seven and nine drugs. The actual employment of these drugs in emergency management is not within the scope of this paper, and can be found in other articles. *(2,3,4,6)*

- Oxygen—as discussed above, the foremost primary "drug"
- Epinephrine 1:10,000 in preloaded syringes—(IV/IM)
- Diphenhydramine (Benadryl)—50 mg/cc in preloaded syringes—(IV/IM)
- Diazepam (Valium)—10 mg/2cc in preloaded syringes—(IV/IM)
- Hydrocortisone (SoluCortef)—100 mg/cc amps—(IV/IM)
- Glyceryl Trinitrate (Nitroglycerine)—.6 mg tabs, FRESH! (6-month shelf life; keep in brown glass bottle only)—(Sublingual)
- Atropine SO^4—.4 mg/cc in multidose vial—(IV/IM)
- Aromatic Spirits of Ammonia—crush ampules—of questionable value except as noxious stimulus—can also be taped to light/chair)
- Aminophylline—250 mg/10 cc (IV/IM), or Isoproteronol (Isuprel) Inhaler

Also available on the board are assorted needles and syringes, arm tourniquet and tape, blood pressure cuff and stethoscope, oral and nasopharyngeal airways (assorted sizes), lubricant, and a clipboard with paper and pencil attached for recording vital signs, drugs, periods of apnea, etc. during the emergency.

Support/Backup Cart

This mobile cart carries advanced airway maintenance gear, parenteral fluid administration equipment, as well as backup drugs which might be requested by a physician or other knowledgeable rescuer. A cardiac arrest spine board is maintained nearby. Drugs contained in this cart are:

- Sodium bicarbonate—44 mEq/50 cc in preloaded syringe sets (4-5 on hand)
- Fifty percent Dextrose solution—50 cc preloaded syringe sets (2-3 on hand)
- One percent Lidocaine HCl, plain—in preloaded syringes, 10 mg/cc (CAUTION: don't use dental carpules for emergencies!)
- Naloxone (Narcan)—.4 mg/cc (IV/IM)
- *One* vasopressor, such as Phenylnephrine 1 percent (Neosynephrine)—10 mg/cc (IV/IM) Wyamine is an acceptable substitute
- Narcotic—Morphine or Demerol are preferred in emergency situations, routine accountability is mandatory.

Equipment

This kit also contains a Gordon-Don Michael Esophogeal Obturating Airway, a recent addition to our armamentarium popularized by the paramedics. Elaboration on the usage and problems of this esophageal airway is beyond the scope of this paper, but the item has proven to be a valuable adjunct in airway management when the rescuer is insufficiently trained or experienced in endotracheal intubation. Proper training in its usage is essential because "iatrogenic misadventures" can occur unless the rescuer is properly trained and advised.

Other equipment includes: a cardiac arrest spine board (¾" plywood, cut to specified shape, to permit placement between the patient's back and the contour chairback); laryngoscope and assorted blades and endotracheal tubes; additional assorted needles and

FIGURE 1. Emergency drug kit

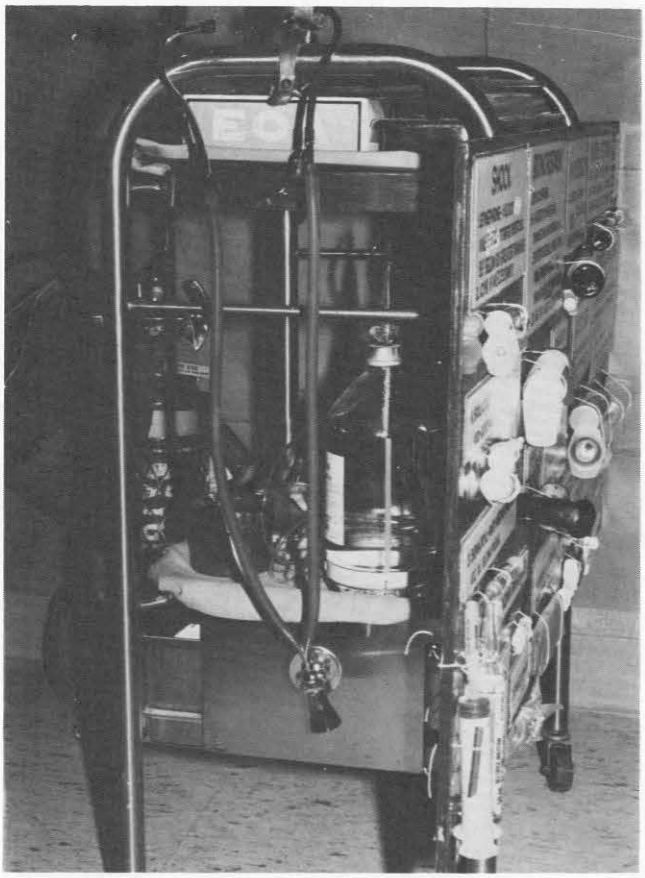

FIGURE 1. Side view of emergency drug kit

syringes, intracatheters, four 1000 cc bottles of Lactated Ringer's Solution (or Normal Saline) with extension tubing, administration sets, armboards and tape; Magill forceps (for endotracheal tube placement or foreign body removal from the throat); and a pharyngeal suction tip or catheter which is compatible with the central suction system.

With these few drugs, and this equipment, an office will be ready to cope with the majority of commonly-occurring emergencies.

The Emergencies

With the equipment ready and the personnel trained, the final preparatory step is to place the myriad of possible emergencies into a workable frame of reference and memory. The format is oversimplified and not infallible, but it does provide a workable arrangement for the general practitioner. Office emergencies can be classified in the following groups:

GROUP I—Historically Predictable Emergencies. These emergencies are unlikely to occur if medical histories are routinely checked and patients evaluated. The dentist will know in advance what compromises exist, what medications are controlling the situation, and what problems might be anticipated. Included in this group of emergencies are diabetic reactions, epileptic seizures, asthma attacks, angina pectoris attacks, etc. The primary reason for being aware of this group is for protection against the "liar"—the individual who consciously or subconsciously withholds critical information, setting the stage for surprises.

GROUP II—Preventable Emergencies. These can be generally avoided by using common sense and good technique (such as the use of aspirating syringes when administering local anesthetics, etc.). Included in this group are anesthetic overdoses, intravascular injections, and psychogenic hyperventilation.

GROUP III—Possible but Uncommon Rare Emergencies. Statistically, these emergencies are very uncommon. This group includes anaphylactic reaction, extrapyramidal reaction, angioedema, CVA (cardiovascular accident), etc.

GROUP IV—Common Emergencies. Episodes of syncope, hypoglycemic reaction, psychogenic reaction (vasovagal), myocardial infarction, etc. are included in this group. Statistically, these emergencies occur with sufficient frequency to warrant constant vigilance.

Summary

The best treatment for any office emergency is prevention. There is no substitute for adequate preparation, proper and up-to-date equipment and drugs, frequent personnel training, precautionary patient evaluation and historical screening, and sound patient management policies. These factors, combined with some common sense, will result in infrequent emergency situations that can be easily managed. Those "close encounters of the worst kind" need not be nightmares in the life of an office staff, providing some forethought is employed, and personnel are properly trained in the fundamentals.

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The Prevalence of Hearing Loss Among Selected Navy Enlisted Personnel

Ronald M. Robertson, Ph.D. John C. Page Carl E. Williams, Ph.D.

Permanent hearing impairment caused by high intensity noise exposure is becoming an increasingly evident problem among naval personnel. There have been indications that reenlistments are down among personnel who work in high intensity noise environments, and increasing numbers of individuals are reportedly filing compensation claims for noise-induced hearing loss. Prior to the present investigation conducted for the Naval Medical Research and Development Command, no reliable body of data existed concerning the prevalence of hearing loss among Navy enlisted personnel. Although clinical experience suggested that the problem was widespread, this observation was impossible to document in any rigorous fashion. The study was undertaken in order to:

- determine the extent to which noise-induced hearing loss exists among Navy enlisted personnel;
- establish a reliable information base on which management decisions could be founded; and
- further document the urgent need for implementing effective hearing conservation programs throughout the Navy.

As Navy hearing conservation programs are implemented in accordance with BUMEDINST 6260.6B,(*1*) it is anticipated that large numbers of hearing impaired personnel will be identified. Disposition of these individuals will be a problem; many should not be permitted to continue in naval service unless they are moved to a quieter work environment. Unfortunately, as is most often the case at the present time, these personnel are returned to their high noise level work environments where further auditory damage is probable. A Department of Defense hearing conservation instruction promulgated on 8 June 1978(*2*) provides added incentive for the Navy to develop a workable disposition program. Information provided herein should be a value in providing an indication of the potential number of personnel that might be involved in such programs.

Procedure

Table I outlines the study design. Based upon the experience of the laboratory staff and with the assistance of senior medical personnel, the apprenticeships and ratings shown were chosen for inclusion in the study. Those respondents were asked to rank order the 15 most noise exposed ratings and the 10 least noise exposed ratings. From this information, the experimental (most noise exposed) and the control (least noise exposed) groups were established. Included in each group were two apprenticeships and eight ratings. Furthermore, for the apprentice groups, four, one-year interval length of service (LOS) categories were established and, for the various ratings, eight LOS categories were defined (1-year intervals through 5 years of service and 5-year intervals through 25 years of service).

Since the purpose of this study was to report on the actual degree of hearing loss that exists in enlisted personnel, corrections for age were not applied to the data.* Presbycusis corrections would have been small had they been applied since the average age of the oldest group in this survey was 40 years. Estimates of the average presbycusis correction for 3,000 through 6,000 kHz at this age vary from 6 dB(*3*) to dB.(*4,5,6*)

A target figure of 3,720 subjects was established—400 for the apprenticeships, 3,200 for the 16 ratings, and 120 recruits. Subjects were, in most cases, identified by computer. Names were supplied by NAVPERS in Washington and the Enlisted Personnel Manage-

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A more comprehensive description of this study may be seen in NAMRL Research Report No. 1251, September 1978.

*The correspondence between increasing hearing loss and increasing age is well known. In the absence of occupational noise exposure this phenomenon is called "presbycusis" or hearing loss due to aging. To account for the possible added influence of a generally noisy society, the term "sociocusis" has also been used.

TABLE I. Study Design

I. *Subject Group:*

A. Experimental

1. Airman (E1-E3)	AN
2. Fireman (E1-E3)	FN
3. Equipment Operator	EO
4. Machinist Mate	MM
5. Engineman	EN
6. Boiler Technician	BT
7. Aviation Mechanic	AM
8. Aviation Machinist Mate	AD
9. Aviation Boatswain Mate	AB
10. Aviation Ordnanceman	AO

B. Control

1. Hospitalman (E1-E3)	HN
2. Dentalman (E1-E3)	DN
3. Hospital Corpsman	HM
4. Dental Technician	DT
5. Mess Management Spec.	MS
6. Yeoman	YN
7. Personnelman	PN
8. Disbursing Clerk	DK
9. Training Device Technician	TD
10. Aviation Maintenance Admin.	AZ

II. *Length of Service Categories (LOS):*

A. Apprenticeships: (AN, FN, HN, DN) 0-1, 1-2, 2-3, 3-4 years

B. Rate Personnel: 1-2, 2-3, 3-4, 4-5, 5-10, 10-15, 15-20, 20-25 years

III. *Number of Subjects Proposed:*

A. 100 in each of the four apprentice groups (25 for each of the four LOS categories)	400
B. 200 in each of the sixteen rated groups (25 for each of the eight LOS categories) for both experimental and control groups	3200
C. Recruit baseline measurements	120
Total Number of Subjects	3720*

IV. *Data Collection:*

A. Air conduction hearing threshold levels and bone conduction hearing threshold levels when necessary (when the sum of the hearing threshold levels at 500, 1,000, and 2,000 Hz was equal to or greater than 45 dB, unmasked bone conduction at 1 kHz was done).

B. Questionnaire (covering medical and noise history as well as current noise exposure).

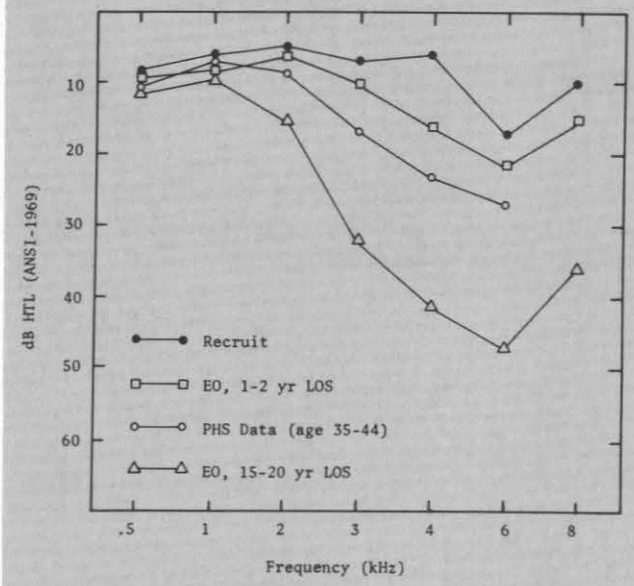
C. Manual audiometry only.

D. Trained technicians or audiologists.

E. Mini-booths, shipped to test site in some cases.

*Data were actually obtained on a total of 3530 subjects (95 percent completion rate).

FIGURE 1. Hearing threshold levels for equipment operators (EO) in 1-2-year and 15-20-year LOS categories. Recruit and PHS data are shown for comparison.



ment Center (EPMAC) in New Orleans. Tests were conducted in over 18 geographic areas (some more then once). Among sites included in the survey were Pensacola, Meridian, Key West, Norfolk, Whidbey Island, and San Diego. A total of 3,530 subjects were actually tested for a completion rate of 95 percent. Females comprised 9 percent of the overall study population (18 percent of the recruits, 16 percent of the control group, and 1.7 percent of the experimental group).

Audiometric tests were conducted with manual audiometers and included a determination of air conduction hearing threshold levels at seven frequencies from 500 to 8,000 Hz. Bone conduction screening was done at 1 kHz when the sum of the air conduction levels at 500, 1,000, and 2,000 Hz was equal to, or greater than, 45 dB. Subjects showing evidence of conductive hearing losses were excluded from the study. The exclusion rate for individuals with suspected conductive hearing loss was 1.3 percent (46 subjects).

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Data were obtained by trained audiometric technicians, except in the San Diego area where the services of an audiologist were contracted. With the exception of Charleston and San Diego where testing was conducted in audiometric test vans, testing was conducted in audiometric test booths located in naval regional clinics. At those locations where sound rooms in regional clinics were unavailable due to normal workload, compact audiometric sound rooms were shipped from Pensacola to the test site. All test environments were checked for background noise level to insure that accurate hearing thresholds could be obtained. Audiometers were calibrated to the ANSI-1969 Standard.(*7*) Physical calibration of audiometers was recent in all cases, and daily calibration checks were made against the technician's own hearing.

Each subject was requested to complete a questionnaire which covered his medical history and his past and current noise exposure histories.

Results and Discussion

Figure 1 shows the increase in high frequency hearing loss over time for individuals in the equipment operator (EO) rating. Shown are data for the 1- to 2-year and 15- to 20-year LOS categories. This substantial worsening of hearing over time was fairly typical of all the experimental ratings, with the EO rating displaying the poorest hearing levels. Average hearing levels for the recruits are shown in the upper curve; included also are hearing level data from the Public Health Service (PHS) study*(*8*) for 35- to 44-year old males. The average age of EO subjects in the 15- to 20-year LOS category was 38 years. It is clear that individuals in the EO rating group are displaying much poorer than their counterparts in the general population.

FIGURE 2. Hearing threshold levels of two private sector industrial populations compared to the Navy equipment operator (EO) and PHS data.

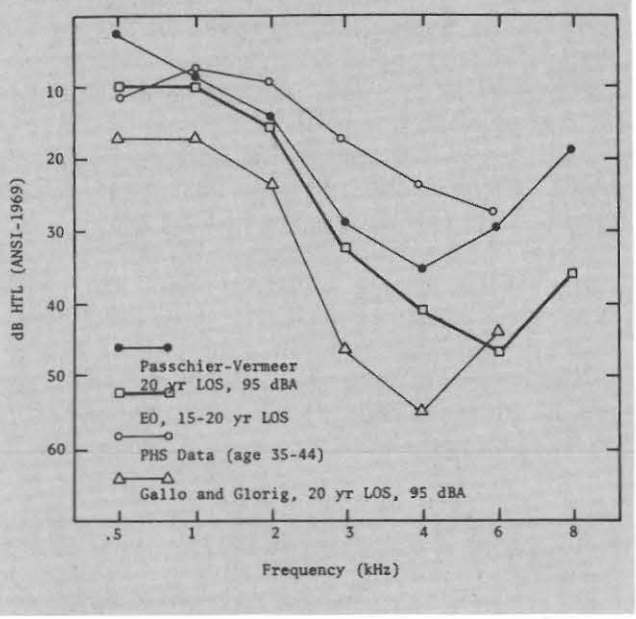


FIGURE 3. Hearing threshold levels for firemen (FN) in 0-1-year and 3-4-year LOS categories. Recruit and PHS data are shown for comparison.

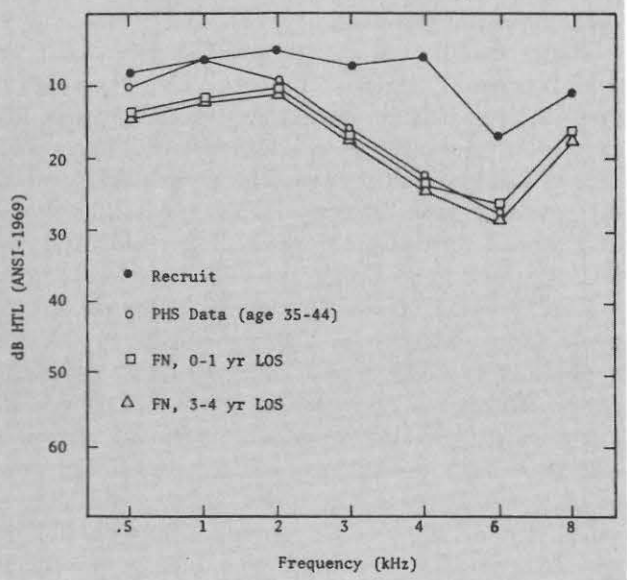


Figure 2 presents a comparison of the 15- to 20-year LOS EO data with hearing level data from two other studies. The PHS curve is also shown again as a reference. The predictive data of Passchier-Vermeer(*5*) are shown for the 50th percentile for workers with 20 years of service and documented exposure to noise levels of 95 dBA. Also shown are the findings of Gallo and Glorig†(*4*) obtained for the same conditions described in the Passchier-Vermeer study. When the high frequency pure tone average (3,000, 4,000, and 6,000 Hz) is considered, hearing levels for the Navy equipment operators lie exactly between the findings of the two other studies. The Gallo and Glorig study yielded the poorest hearing levels, while the high frequency

*To permit direct comparison with results of the present study, all PHS data were converted to the current American National Standard Institute (ANSI) standard(*7*) from the earlier ASA standard.

†Data have been converted to the current ANSI standard.(*7*)

average in the Passchier-Vermeer study barely met the present study's 30 dB criterion for a significant high frequency hearing loss. Caution should be used in comparing the data in Figure 2 as the variables involved in the studies are manifold.

Figure 3 shows the recruit and PHS data again, this time compared with the fireman (FN) experimental group apprentice rate data for the 0-1 and 3-4 year LOS categories. Three things are demonstrated here: First, note the divergence between the recruit data and the 0-1 year FN data. Hearing levels apparently change very rapidly for this group after their recruit training. Second, there is no significant difference between the 0-1 and 3-4 year LOS categories. After the initial relatively rapid decrease in hearing sensitivity, hearing apparently is fairly stable over the first enlistment period. Third, the PHS data for the 35- to 44-year-old group correspond almost perfectly in the 2-6 kHz range with those from FN subjects whose average age range is only 19-22 years. In other words, the hearing sensitivity of the Navy's average 20-year old FN appears comparable to that of a typical 40-year-old male in the general population.

Figure 4 shows the control group rating (i.e., hospitalmen) with the largest shift in hearing over time. Again, recruit and PHS data are shown for comparison. The hearing threshold levels for the hospitalmen are not much better than threshold levels for EOs in the 15-20 year LOS group shown in Figure 3. One possible explanation for this is that 84 percent of the HM in the 20- to 25-year LOS category served in combat areas in Vietnam where opportunity for increased noise exposure was heightened. Duty tours ranged from 8 to 46 months, with an average tour of 17 months.

FIGURE 4. Hearing threshold levels for hospitalmen (HM) in 1-2-year and 20-25-year LOS categories. Recruit and PHS data are shown for comparison.

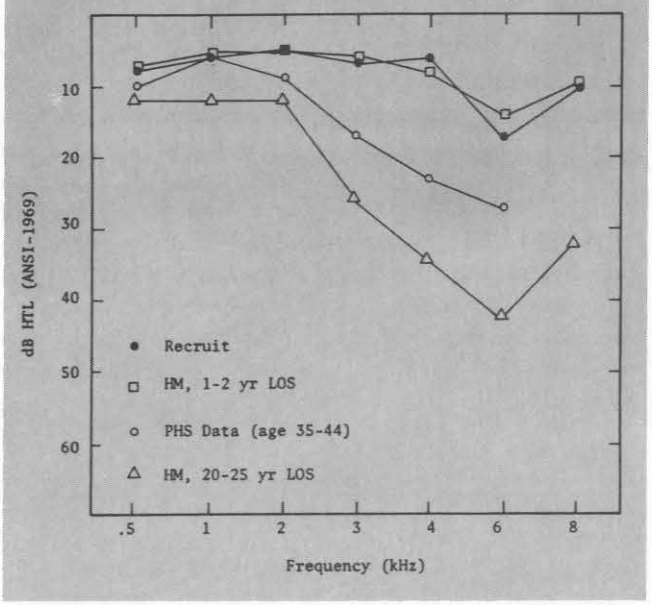
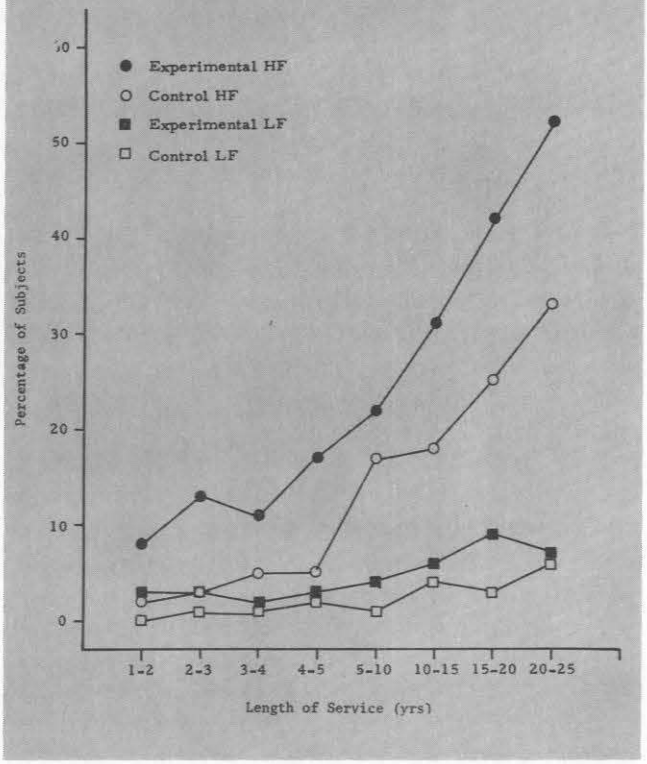


FIGURE 5. Percentage of subjects with high frequency (HF) and low frequency (LF) hearing loss by length of service.



Half of the control group ratings in the longest duration LOS category demonstrated about the same hearing levels as the 35- to 44- year PHS data. The remaining control group ratings showed poorer hearing than the PHS data. *All* experimental group ratings in the longest duration LOS category demonstrated poorer hearing when compared to the PHS findings.

Figure 5 shows the percentage of subject (pooled across ratings) having significant high- and low-frequency hearing losses by length of service.* The increase in significant high frequency hearing loss over time is evident in both the experimental and control groups. However, there is an obvious separation between the experimental and control groups for this

*A significant high frequency loss is defined as an average hearing threshold level at 3, 4, and 6 kHz of 30 dB or greater. Thirty dB was chosen because, in general, some difficulty with speech discrimination in noise would be expected with this degree of impairment.

parameter. For the 20- to 25-year LOS category there is nearly a 20 percent greater proportion of high frequency loss for the experimental group than for the control group. The 17-33 percent range of high frequency loss in the control group from five years onward should also be recognized as significant.

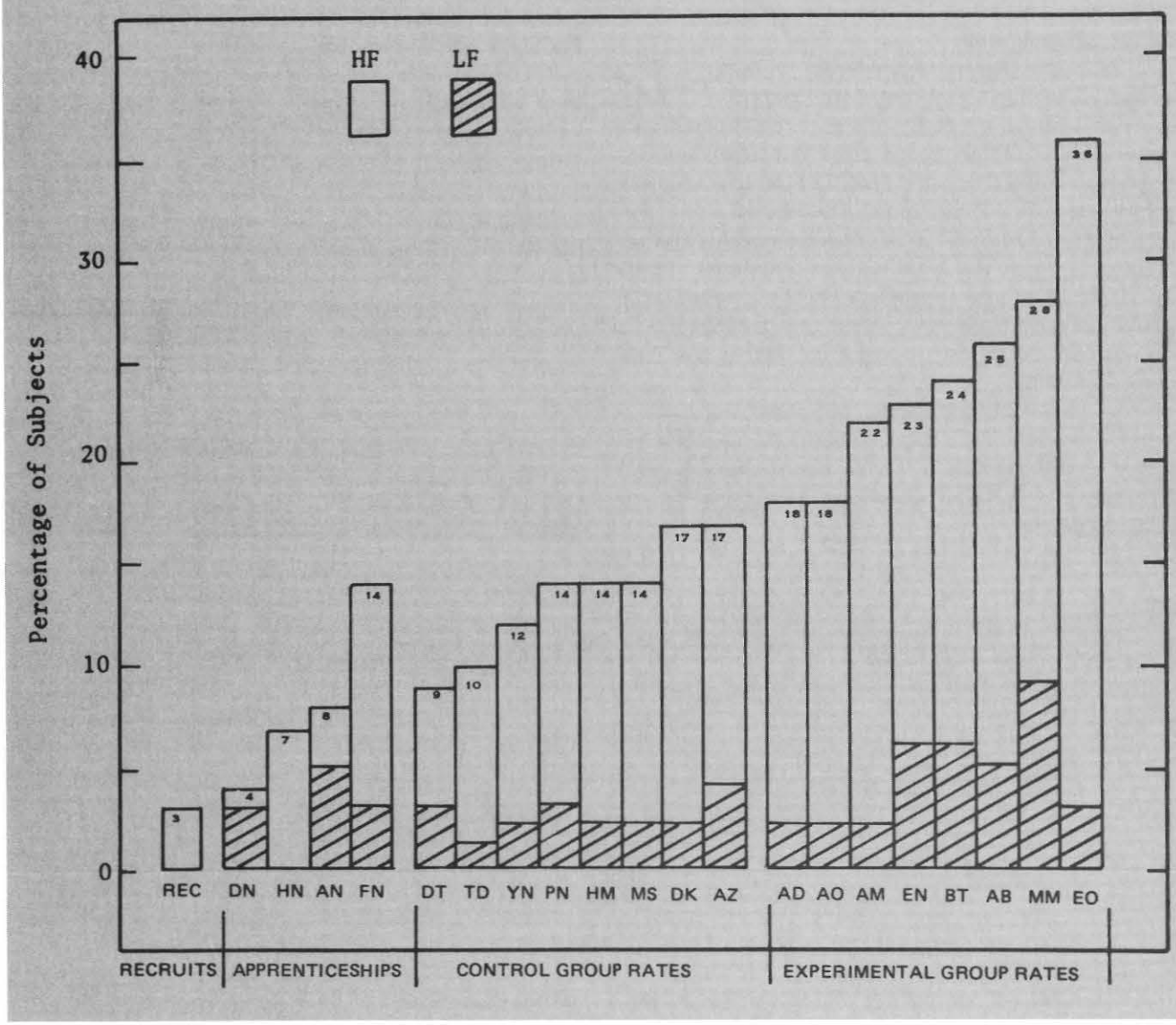
Low frequency losses rose very slowly and were similar for both the experimental and control groups.*

*A significant low frequency loss is defined as an average hearing threshold level of 25 dB or greater for the frequencies 500, 1,000, and 2,000 Hz. Twenty-five dB was chosen because, in general, difficulty with faint speech begins at about this level.

The percentage of subjects involved ranged from zero to about 9 percent. It is characteristic of noise induced hearing loss that low frequency impairment is much less than high frequency loss, and the progression over time is slower for low frequency hearing impairment.

Figure 6 presents the percentage of subjects with significant high and low frequency hearing losses by rating, averaged across LOS categories. The percentages are arranged in ascending order for the recruits, the four apprentice groups, and the 16 ratings. Note that the experimental and control groups show a continuum of percentage values, with the control group showing consistently less high frequency hearing loss

FIGURE 6. Percentage of subjects with significant high (HF) and low frequency (LF) hearing loss by rating.



than the experimental group. Note the relatively high percentage shown for the FN group. This apprenticeship channels into the EN, BT, and MM ratings, which all show some of the largest percentage of high frequency losses observed in the study.

The hatched portions of Figure 6 show the percentages for significant low frequency loss. There is a good deal more overlap between the experimental and control groups for the low frequency than for the high frequency parameter. This is to be expected since noise induced hearing loss does not affect the speech frequencies (500-2,000 Hz) unless the loss is very severe. The low frequency average is a good estimate of the speech reception threshold (SRT).

While the prevalence of significant low frequency loss is not to be ignored, it is clear that the major problem is the substantial prevalence of high frequency losses, not only in the experimental group but in the control group as well.

To get some idea of the potential number of naval personnel having significant high frequency hearing losses and for an overview of the percentages of personnel affected in the experimental and control groups, the data in Table II are presented. In the control group approximately 8,000 personnel could be affected. This represents 1 of every 14 in the apprenticeships and *one of every eight* in the eight ratings examined. In the experimental group approximately 23,000 personnel could be involved. This represents one of every nine in the apprenticeships and *one of every four* in the eight ratings studied.

In the present investigation, attention was given to about 20 percent of the approximately 80 ratings in the Navy. Considering this, it is clear that the total number of personnel exhibiting significant hearing loss is indeed formidable.

Conclusions

The data obtained in this study support the presentation of the following conclusions:

- Thirty-seven percent of the experimental group and 23 percent of the control group demonstrated a significant high frequency loss beyond 4 to 5 years of service.
- The Equipment Operator rating displayed the highest percentage of high frequency hearing loss of any rating studied.
- The prevalence of low frequency hearing loss was relatively low (4 to 7 percent) and was more pronounced for the experimental group ratings.
- Personnel in all of the experimental group ratings and in one-half of the control group ratings demonstrated poorer hearing than comparable aged adult males for whom data were obtained in the 1960-62 Public Health Survey. (*8*)
- The problem of hearing loss is more widespread than was originally thought. In many instances, the hearing threshold levels of subjects in the control group ratings approached hearing levels of individuals in the experimental group ratings. Overall, one of every eight subjects in the control group ratings (estimated 8,000 personnel) and one of every four subjects in the experimental group ratings (estimated 23,000 personnel) had a significant high frequency hearing loss. The significant decline in hearing over time for both groups cannot be accounted for simply on the basis of aging.

These findings indicate that a vital sensory function of naval personnel is being degraded or lost. Loss of hearing has a tremendous impact not only on the individual and his family, but, in aggregate, also upon the operational readiness and efficiency of the Navy.

TABLE II. Estimated Number of Personnel with Significant High Frequency Hearing Loss

	Experimental				Control		
	Current On-Board Pop.	Percentage of Sample	Estimated Number		Current On-Board Pop.	Percentage of Sample	Estimated Number
Apprent.	34,366	11%	3,756	Apprent.	5,634	7%	372
Ratings	83,088	24%	19,778	Ratings	59,187	14%	8,044
	117,490		23,534		64,821		8,416

Recommendations

- The immediate and full implementation of naval hearing conservation programs is imperative. More attention must be paid to ratings that have been assumed free from noise hazards in the past.
- A study of the prevalence of hearing loss among the various construction battalion ratings should be undertaken.

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SCHOLAR'S SCUTTLEBUTT

AFHPSP Student Air Travel Within CONUS

Members of the Armed Forces Health Professions Scholarship Program (AFHPSP) are eligible to travel within the continental United States aboard DOD-controlled aircraft at any time during their participation in the program. Such travel, however, is subject to the guidelines enumerated in the succeeding paragraphs.

Students fall into Military Airlift Command Category Four, which is "space available" of a low priority. HPSP members will be assigned seats on aircraft after the personnel listed below have been seated:

- Active Duty Personnel on emergency leave.
- Active Duty Personnel on regular leave and dependents of missing or captured personnel.
- Medal of Honor holders.

Military personnel are required to wear the uniform while traveling aboard DOD-controlled aircraft. HPSP students may wear the uniforms listed below:

MALE

Winter: Service Dress Blue
Summer: Summer White
Summer Blue

FEMALE

Winter: Service Dress Blue (A or B)
Summer: Summer Blue (A or B)

Members must possess a valid Armed Forces I.D. Card when traveling aboard DOD-controlled aircraft. In the case of the AFHPSP, students must carry a valid DD Form 2 (red) when performing such travel.

Members of Military Reserve Components are required to possess an Authentication of Reserve Status for Travel Eligibility (DD Form 1853) when traveling aboard DOD-controlled aircraft. These forms may be obtained by forwarding a letter of request stating the intended travel dates to the Commanding Officer, Naval Health Sciences Education and Training Command (Code 9), National Naval Medical Center, Bethesda, Md. 20014. Requests should be forwarded no more than 30 days prior to the desired travel date. Forms will be issued for a period not to exceed 90 days.

Since students will be performing travel in uniform, they must conform to current Navy grooming standards as set forth in U.S. Navy Uniform Regulations, 1975 (change-1). Particular attention should be addressed to hair length and the wearing of articles of jewelry. It should be noted that members who attempt to board aircraft, but fail to comply with such standards, will be denied a seat.

Information concerning the flight schedules of DOD-controlled aircraft and seat availability may be obtained from the Passenger Services Section at military air installations. Students may obtain limited information concerning flight schedules by telephone, but should be aware that such schedules are subject to frequent last minute changes.

Students should insure that they have ample funds available for their return trip via commercial carrier in the event a DOD-controlled flight is not available. The student is solely responsible for being at his appointed place of duty at the appointed time.

Finally, HPSP students should be aware that they are responsible for insuring that their behavior while traveling aboard DOD aircraft reflects dignity and credit upon themselves and the U.S. Navy. Behavior which does not meet these standards may cause the member to be denied a seat aboard the aircraft and subject the member to disciplinary action.

BUMED SITREP

AMSUS MEMBERSHIPS AVAILABLE

It may prove productive for all Medical Department officers not currently members of the Association of Military Surgeons of the United States to investigate the benefits of membership. Pertinent details regarding memberships and/or subscription to AMSUS' official journal *Military Medicine* are available by contacting the Association of Military Surgeons of the United States, P.O. Box 104, 10605 Concord Street, Suite 306, Kensington, Md. 20795.

MEDICO-LEGAL FEEDBACK—INTERNATIONAL AGREEMENTS

The laws and regulations governing negotiation and conclusion of international agreements (INTAGs) have caused considerable difficulties for some activities. While few BUMED-managed facilities are in a position to utilize INTAGs, those that are must be aware of the requirements of the four applicable directves: DODDIR 5530.3; SECNAVINST 5710.25; OPNAVINST 5710.24; and OPNAVINST 5710.25. Of these, the last is the most important and the most helpful.

Approval authority for INTAGs is held extremely close: Chief, BUMED has only limited authority, and CNO must approve all other agreements. Local commands *do not* have authority to negotiate or execute international agreements without prior approval as required by the four instructions.

Information exchange projects, cooperative arrangements with local health agencies, and other agreements with foreign governments or international organizations that are reduced to writing fall within the definition of INTAG as set forth in the DODDIR. In any case in which it is desired to negotiate an INTAG, the command should first consider the four regulations listed above and then should coordinate with this Bureau for further guidance.

RUBELLA AMONG HOSPITAL PERSONNEL AND PATIENTS

BUMEDINST 6230.1H, Supplement 1, directs the initiation of a rubella immunization program for Navy and Marine Corps recruits and indicates that rubella vaccine may be utilized at the discretion of local military commanders to control outbreaks in active duty personnel. The Morbidity and Mortality Weekly Report (MMWR), of the Center for Disease Control, dated 20 July 1979, records an outbreak of rubella in employees and patients of a hospital and rehabilitation center in Denver. CDC indicates that outbreaks of rubella in hospital employees have been receiving increased attention recently although only 10 to 15 percent of the unimmunized adult population is susceptible to rubella. While rubella immunization cannot be mandated for civilian employees and is not a routine immunization requirement for active duty personnel other than recruits, the hospital environment should be recognized as an ideal setting for rubella transmission. Commanding officers of Navy Medical Department activities, therefore, should continue to closely monitor the potential for rubella outbreaks in their facilities and be prepared to interrupt transmission with immunization programs where appropriate.

COURSES OFFERED BY RADIOLOGICAL RESEARCH INSTITUTE

The Armed Forces Radiological Research Institute, Bethesda, Md., will present two courses in Medical Effects of Nuclear Weapons, 13-16 Nov 1979 and 6-9 May 1980. Students should be physicians or personnel associated with radiation injuries. Commands are invited to submit nominations to BUMED-MED 21. Information required: (a) name, (b) rank/designator, (c) social security number, (d) security clearance (secret required), and (e) address for correspondence.

PERIODIC PHYSICALS ON PERSONNEL RETAINED ON THE TEMPORARY DISABILITY RETIRED LIST REQUIRED

Navy and Marine Corps personnel assigned to the Temporary Disability Retired List are required to undergo periodic physical examinations. Failure to comply with these periodic physical examinations may result in stoppage of disability payments, pending review of their periodic physicals. Information received from the Central Physical Evaluation Board indicates that while members on the Temporary Disability Retired List are receiving their periodic physicals as scheduled, administrative processing has resulted in inordinate delays through no fault of the member. In addition, Article 0603 of SECNAVINST 1850.4 requires that the periodic physical incorporate an employment history of the member since his placement on the Temporary Disability Retired List.

(Continued from p.1)

physician substitute, but as a more finely trained advanced hospital corpsman. As it stands, physician's assistant billets are not an additional authorization to Navy end strength, and until provision is made for them, other officer billets must continue to be reduced to accommodate increased numbers of physician's assistants.

For the peacetime role of the Medical Department, the Navy could use more physician's assistants to take care of the Navy's dependent and retired beneficiaries. However, they would have to be provided at the expense of Medical Corps officer billets. The Navy Medical Department cannot afford the trade-off and still remain capable of responding to the contingency mission.

Quality Health Care

Another item that affects retention, both in the Medical Department and the Navy, is the environment in which health care is delivered. We recognize and thank the Congress for their efforts to help us alleviate the backlog of maintenance in our aging medical and dental facilities.

Though our request this year contains an additional $5 million for maintenance of real property, our backlog, currently $42 million, will probably continue to grow because of the extraordinary inflationary pressures in the construction and repair industry. Modern, well maintained facilities provide esthetic benefit to patients and staff, promote efficiency, and contribute to retention of personnel.

It is equally important for us to carefully distribute funding between facilities and equipment so that military health care personnel can develop and maintain skills needed to care for authorized beneficiaries during peacetime as well as in wartime.

INDEPENDENT DUTY - UPDATE

The Seven Year Itch

Scabies, also known as the "seven year itch," is an infectious disease of the skin caused by the sarcoptic mite, *Scarcoptes scabiei hominis.* Scabies has a universal distribution and is most often found among crowded populations with poor sanitation. The mites are primarily spread through close body contact and to a lesser degree by contact with contaminated clothing and bedding. Sexual contact is a common means of spreading the infestation. Interdigital or between the fingers infestations are common, hence shaking hands is also a way of transferring the mites.

The mites penetrate the skin surface and burrow just beneath it. Papules or vesicles may form at the penetration site and linear burrows containing the mites and their eggs may be seen. Lesions caused by the mites may be prominent around the interdigital webbing, extensor surfaces of the wrists and elbows, axillae, the abdomen and belt line, scrotum, penis, and areolae of the nipples. In severe cases, lesions may extend around the trunk to the middle of the back. The face, scalp, palms, and soles are rarely involved in adults; however, all the body surfaces of infants are susceptible.

The incubation period may be several days to weeks before the infestation is noticed and the period of communicability lasts until the mites and eggs are killed by proper treatment.

Severe itching shortly after a warm bath or going to bed is a cardinal symptom of scabies. This is due to increased mite activity in response to increased body warmth. Scratching does kill some mites, but it also serves to spread the mites to new locations. It may also lead to secondary infections.

The definitive diagnosis, based on the demonstration of the mite, is sometimes difficult. The mite burrows appear as fine lines a few millimeters long on the surface of the skin. One end of the burrow may be marked by a black plug of crusted serum and mite feces. The blind end of the burrow, containing the female mite, may be marked by a vesicle. This end should be excised and the contents placed on a glass slide in 10 percent potassium hydroxide. After adding a coverslip, the slide should be examined microscopically. Finding any stage of the mite is diagnostic.

Treatment consists of the application of 1 percent gamma benzene hexachloride (Kwell) or an emulsion of benzyl benzoate ointment. This is followed the next day by a thorough cleansing bath or shower. Itching, which is caused by toxic secretions and excretions from the mite, may persist for several days and should not be construed as treatment failure.

In approximately 5 percent of cases a second treatment is necessary 7 to 10 days after the initial one.

Scabies is not life threatening and untreated cases often terminate spontaneously. However, scabies is an important disease to the military. Historically, military operations have been affected due to many lost man-days resulting from scabies-related sleepless nights!

—Reprinted from *The Mike Flag,* newsletter of the U.S. Navy Environmental and Preventive Medicine Unit 7, July 1979.

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